TOSHIBA

Automotive Devices

Selection Guide 2021

Applications of Car Electronics

HEV/EV
- Inverter, Motor Generator
- DC-DC Converter
- Battery Management System (BMS)

Active/Passive Safety
- Pre-Crash Seat Belt
- Electric Power Steering (EPS)
- Brake (ABS, ESC)
- Electric Control Suspension

Power Train
- Gasoline Engine System
- Direct Injection System
- Idling Stop DC-DC Converter
- Transmission Control
- Cooling Fan
- Various Pump (Brushless Motor)

Body Control
- Wiper
- Body Control Module (BCM)
- Air Conditioner (HVAC)
- Power Door/EPB
- LED Head Lamp

Other
- Junction Box
- Advanced Driver Assistance System (ADAS)
- In Vehicle Infotainment (IVI)
- Bus line protection

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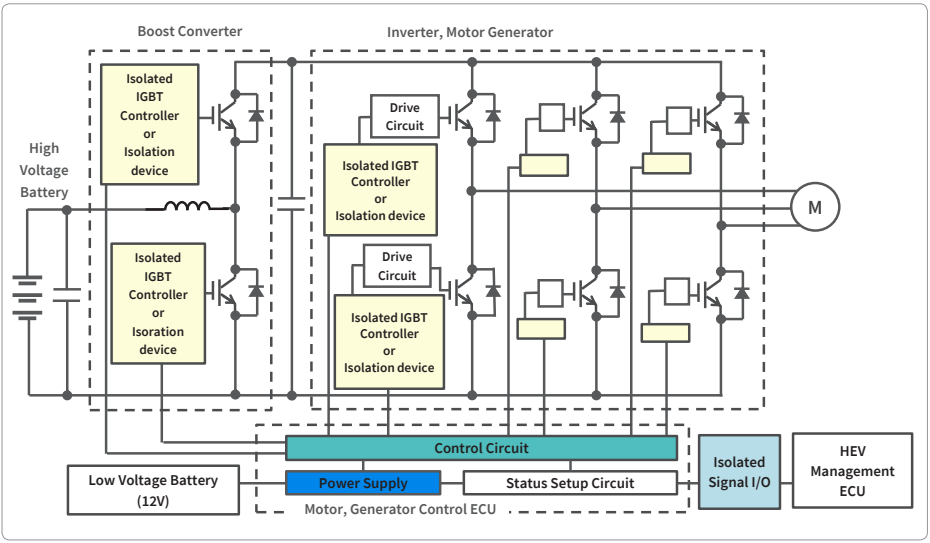
Application **1. HEV / EV**

1-1. Inverter, Motor Generator

System Block



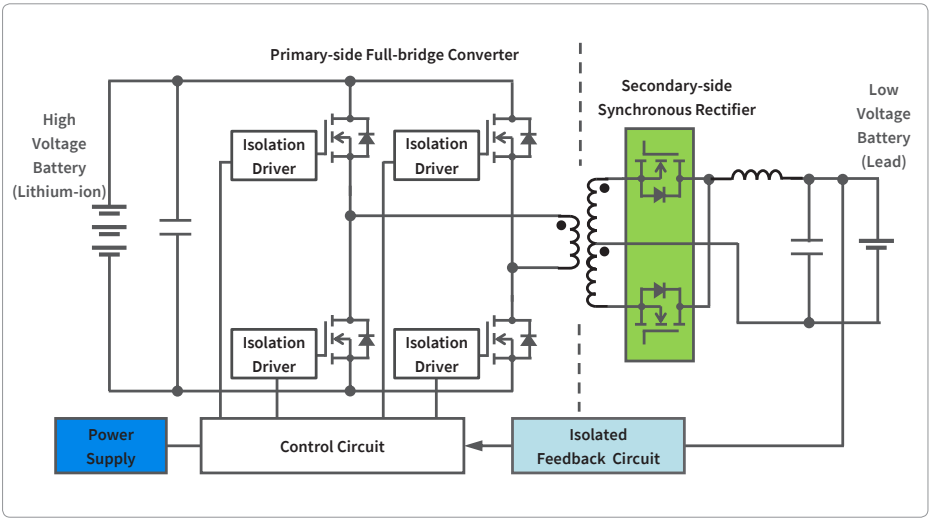
Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Power Supply	MOSFET	DPAK+	TK45S06K3L	N-ch, 60 V/45 A, 10.5 mΩ, Tch=175°C	AEC-Q101
			TJ60S06M3L	P-ch, -60 V/-60 A, 11.2 mΩ, Tch=175°C	AEC-Q101
Isolated IGBT Controller or Isolation device	Photocoupler	5pin SO6	TLX9304	Open collector output,1 M LOGIC, T_{opr}=-40 to 125°C	AEC-Q101
		4pin SO6	TLX9185A	Transistor output, T_{opr}=-40 to 125°C	AEC-Q101
			TLX9300	Transistor output with R_{BE}, T_{opr}=-40 to 125°C	AEC-Q101
		SO4	TLX9291A	Transistor output, T_{opr}=-40 to 125°C	AEC-Q101
			TLX9000	Transistor output with R_{BE}, T_{opr}=-40 to 125°C	AEC-Q101
Isolated Signal I/O	Photocoupler	5pin SO6	TLX9304	Open collector output,1 M LOGIC, T_{opr}=-40 to 125°C	AEC-Q101
			TLX9309	Open collector output,1 M ANALOG, T_{opr}=-40 to 125°C	AEC-Q101
			TLX9310	Totempole output,5 M LOGIC, T_{opr}=-40 to 105°C	AEC-Q101
			TLX9378	Open collector output,10 M LOGIC, T_{opr}=-40 to 125°C	AEC-Q101
			TLX9376	Totempole output,20 M LOGIC, T_{opr}=-40 to 125°C	AEC-Q101
Control Circuit	Logic IC	TSSOP20B	TC74VHC9363FT	Dual 3 bit buffer for control signal of High-side and Low-side circuits. T_{opr}=-40 to 125°C	AEC-Q101
			TC74VHC9364FT		

Application **1. HEV / EV**

1-2. DC-DC Converter

System Block

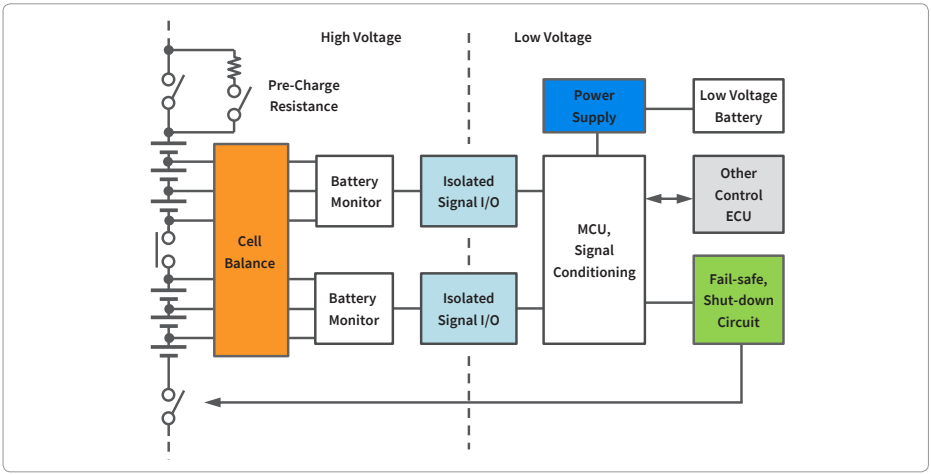


Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Secondary-side Synchronous Rectifier	MOSFET	TO-220SM(W)	XK1R9F10QB	N-ch, 100 V/160 A, 1.92 mΩ, Tch=175°C	AEC-Q101
			TK60S10N1L	N-ch, 100 V/60 A, 6.11 mΩ, Tch=175°C	AEC-Q101
Power Supply	MOSFET	DPAK+	TK45S06K3L	N-ch, 60 V/45 A, 10.5 mΩ, Tch=175°C	AEC-Q101
			TJ60S06M3L	P-ch, -60 V/-60 A, 11.2 mΩ, Tch=175°C	AEC-Q101
Isolated Feedback Circuit	Photocoupler	4pin SO6	TLX9185A	Transistor output, T_{opr}=-40 to 125°C	AEC-Q101
			TLX9300	Transistor output with R_{BE}, T_{opr}=-40 to 125°C	AEC-Q101
		SO4	TLX9291A	Transistor output, T_{opr}=-40 to 125°C	AEC-Q101
			TLX9000	Transistor output with R_{BE}, T_{opr}=-40 to 125°C	AEC-Q101

1-3. Battery Management System (BMS)

System Block



Recommended Devices

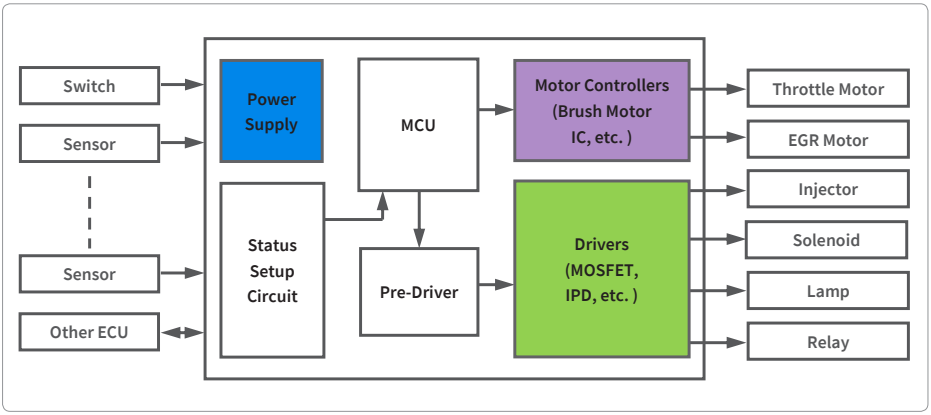
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Power Supply	Bipolar Tr	New PW-Mold	TTB002	PNP, -60 V/-3 A, $V_{CE(sat)}$=-1.7 V @-3 A, T_j=175°C For external of TB9005FNG	AEC-Q101
	MOSFET	DPAK+	TK45S06K3L	N-ch, 60 V/45 A, 10.5 mΩ, Tch=175°C	AEC-Q101
			TJ60S06M3L	P-ch, -60 V/-60 A, 11.2 mΩ, Tch=175°C	AEC-Q101
	System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG Series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
Fail-safe, Shut Down Circuit	IPD (HSS)	WSON10	TPD1055FA	High-side 1ch, $V_{DD(opr)}$ =5 to 18 V, I_O=3 A, 0.12 Ω T_{opr}: -40 to 125°C	AEC-Q100
	IPD (LSS)	PS-8	TPD1044F	Low-side 1ch, V_{DS}=41 V, I_O=1 A, 0.6 Ω T_{opr}: -40 to 125°C	AEC-Q100
Cell Balance	MOSFET	UF6	SSM6N24TU	N-chx2, 30 V/0.5 A, 145 mΩ	AEC-Q101
			SSM6N39TU	N-chx2, 20 V/1.6 A, 139 mΩ	AEC-Q101
			SSM6N62TU	N-chx2, 20 V/0.8 A, 85 mΩ	AEC-Q101
			SSM6P39TU	P-chx2, -20 V/-1.5 A, 294 mΩ	AEC-Q101
		SOT-23F	SSM3K376R	N-ch, 30 V/4.0 A, 56 mΩ	AEC-Q101
	Photorelay	4pin SO6	TLX9175J	V_{OFF}=600 V, T_{opr}=-55 to 105°C	AEC-Q101
		12pin SO16L	TLX9160T*	V_{OFF}=1500 V, T_{opr}=-40 to 125°C	**
Isolated Signal I/O	Photocoupler	5pin SO6	TLX9304	Open collector output,1 M LOGIC, T_{opr}=-40 to 125°C	AEC-Q101
			TLX9309	Open collector output,1 M ANALOG, T_{opr}=-40 to 125°C	AEC-Q101
			TLX9310	Totempole output,5 M LOGIC, T_{opr}=-40 to 105°C	AEC-Q101
			TLX9378	Open collector output,10 M LOGIC, T_{opr}=-40 to 125°C	AEC-Q101
			TLX9376	Totempole output,20 M LOGIC, T_{opr}=-40 to 125°C	AEC-Q101
Other Control ECU	Stepping Motor Driver	P-VQFN28	TB9120AFTG	2-phase bipolar stepping motor driver with a clock input interface	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application **2. Power Train**

2-1. Gasoline Engine System

System Block



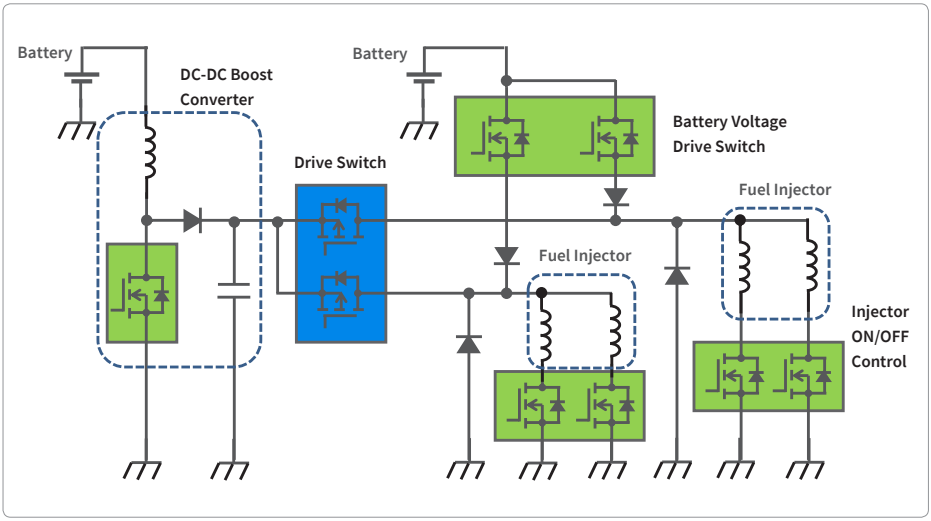
Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Drivers for Injector, Solenoid, Lamp, etc.	MOSFET	DPAK+	TK25S06N1L	N-ch, 60 V/25 A, 18.5 mΩ, Tch=175°C	AEC-Q101
			TK40S06N1L	N-ch, 60 V/40 A, 10.5 mΩ, Tch=175°C	AEC-Q101
		SOP Advance (WF)	S1NL9*	P-ch,- 60 V/-60 A, 13 mΩ, Tch=175°C	**
		TSON Advance (WF)	XPN12006NC	N-ch, 60 V/20 A, 12.0mΩ, Tch=175°C	AEC-Q101
			S1NM0*	P-ch,- 60 V/-25 A, 27.3 mΩ, Tch=175°C	**
	IPD (HSS)	WSON10	TPD1055FA	High-side 1 ch, $V_{DD(opr)}$= 5 to 18 V, I_O=3 A, 0.12 Ω T_{opr}: -40 to 125°C	AEC-Q100
Motor Controllers	IPD (LSS)	PS-8	TPD1044F	Low-side 1ch, V_{DS}=40 V, I_O=1 A, 0.6 Ω T_{opr}: -40 to 125°C	AEC-Q100
	MCD	P-QFN28	TB9051FTG	1ch H-Bridge driver(P-ch+N-ch), Iout=±5 A T_{opr} : -40 to 125°C	AEC-Q100
Power Supply	MOSFET	DPAK+	TJ8S06M3L	P-ch, -60 V/-8 A, 104 mΩ, Tch=175°C	AEC-Q101
	System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG Series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

2-2. Direct Injection Engine System

System Block



Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Boost Converter, Injector Control, Battery Voltage Drive Switch	MOSFET	SOP Advance (WF)	XPH6R30ANB	N-ch, 100 V/45 A, 6.3mΩ, Tch=175°C	AEC-Q101
			XPH4R10ANB	N-ch, 100 V/70 A, 4.1mΩ, Tch=175°C	AEC-Q101
		TSON Advance (WF)	XPN7R104NC	N-ch, 40 V/20 A, 7.1mΩ, Tch=175°C	AEC-Q101
			XPN12006NC	N-ch, 60 V/20 A, 12.0mΩ, Tch=175°C	AEC-Q101
			XPN2400ANC*	N-ch, 100 V/20 A, 23.6mΩ, Tch=175°C	**
			XPN1400ANC*	N-ch, 100 V/30 A, 13.5mΩ, Tch=175°C	**
Drive Switch	MOSFET	DPAK+	TJ30S06M3L	P-ch, -60 V/-30 A, 21.8 mΩ, Tch=175°C	AEC-Q101
		SOP Advance (WF)	S1NL9*	P-ch,- 60 V/-60 A, 13 mΩ, Tch=175°C	**
		TSON Advance (WF)	XPN19014MC*	P-ch,- 40 V/-20 A, 18.7 mΩ, Tch=175°C	**
			XPN9R614MC	P-ch,- 40 V/-40 A, 9.6 mΩ, Tch=175°C	AEC-Q101
			S1NM0*	P-ch,- 60 V/-25 A, 27.3 mΩ, Tch=175°C	**
Motor Controllers	MCD	P-QFN28	TB9051FTG	1ch H-Bridge driver(P-ch+N-ch), Iout=±5 A, T_{opr} : -40 to 125°C	AEC-Q100
Power Supply	System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100

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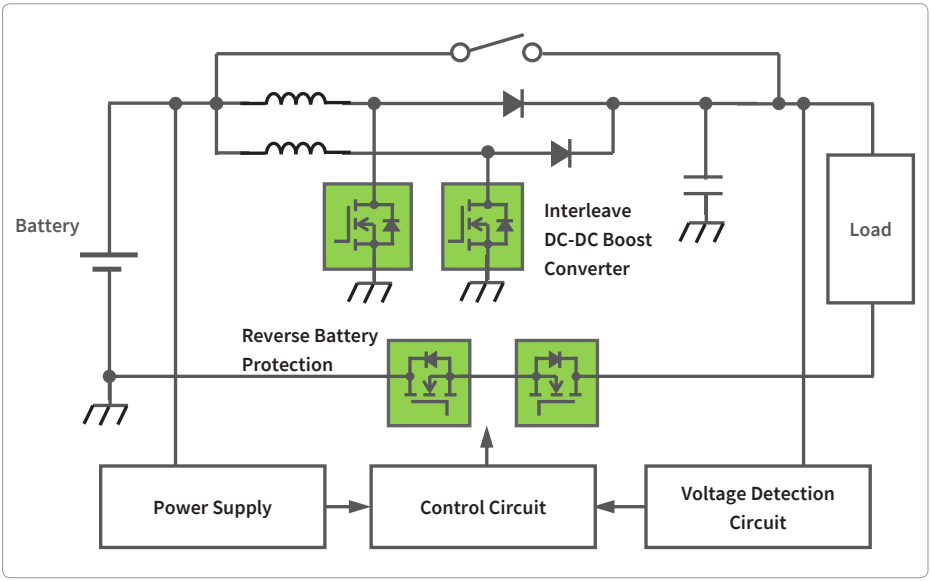
Application **2. Power Train**

2-3. Idling Stop DC-DC Converter

System Block



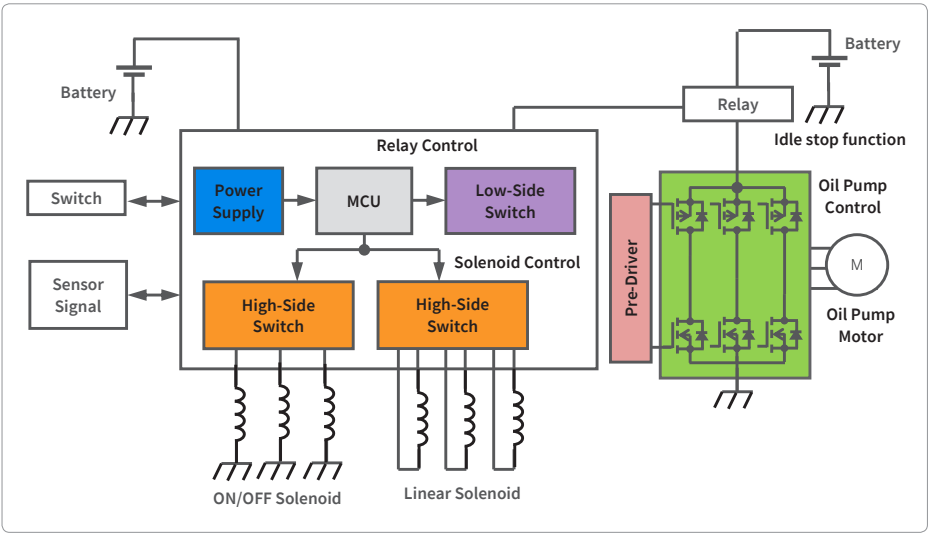
Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Boost Converter, Reverse Battery Protection	MOSFET	SOP Advance (WF)	TPH1R104PB	N-ch, 40 V/120 A, 1.14 mΩ, Tch=175°C	AEC-Q101
			TPHR7904PB	N-ch, 40 V/150 A, 0.79 mΩ, Tch=175°C	AEC-Q101
		TO-220SM(W)	TK200F04N1L	N-ch, 40 V/200 A, 0.9 mΩ, Tch=175°C	AEC-Q101
			TKR74F04PB	N-ch, 40 V/250 A, 0.74 mΩ, Tch=175°C	AEC-Q101
			XK4R0F10QB*	N-ch, 100 V/60 A, 4.0 mΩ, Tch=175°C	**
			XK1R9F10QB	N-ch, 100 V/160 A, 1.92 mΩ, Tch=175°C	AEC-Q101
	IPD (Gate Driver)	PS-8	TPD7104AF	High Side N-ch Pw-MOSFET Gate Driver, 1ch T_{opr}: -40 to 125°C	AEC-Q100
		SSOP16	TPD7106F	High Side 1 ch N-ch Pw-MOSFET Gate Driver T_{opr}: -40 to 150°C	AEC-Q100
		WSON10A	TPD7107F	High Side N-ch Pw-MOSFET Gate Driver, 1ch T_{opr}: -40 to 125°C	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

2-4. Transmission Control

System Block



Recommended Devices

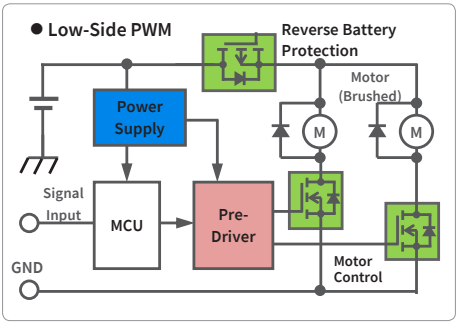
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Solenoid Control	IPD (HSS)	WSON10	TPD1055FA	High-side 1 ch, $V_{DD(opr)}$= 5 to 18 V, I_O=3 A, 0.12 Ω T_{opr}: -40 to 125°C	AEC-Q100
Relay Control	IPD (LSS)	PS-8	TPD1044F	Low-side 1 ch, V_{DS}=41 V, I_O=1 A, 0.6 Ω T_{opr}: -40 to 125°C	AEC-Q100
			TPD1054F	Low-side 1 ch, V_{DS}=40 V, I_O=1 A, 0.8 Ω T_{opr}: -40 to 125°C	AEC-Q100
Oil Pump Control	MOSFET	DPAK+	TK65S04N1L	N-ch, 40 V/65 A, 4.3 mΩ, Tch=175°C	AEC-Q101
			TJ60S04M3L	P-ch, -40 V/-60 A, 6.3 mΩ, Tch=175°C	AEC-Q101
		SOP Advance (WF)	TPH1R104PB	N-ch, 40 V/120 A, 1.14 mΩ, Tch=175°C	AEC-Q101
			TPHR7904PB	N-ch, 40 V/150 A, 0.79 mΩ, Tch=175°C	AEC-Q101
Pre-Driver	IPD (Pre-Driver)	PS-8	TPD7211F	Half-Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 125°C	-
		WQFN32	TPD7212F	Three-Phase Full Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150°C	AEC-Q100
	MCD	SSOP24 -0.65	TB9061AFNG	Three-Phase Brushless Sensor-less Pre-Driver T_{opr} : -40 to 125°C	AEC-Q100
Power Supply	MOSFET	TSON Advance (WF)	XPN19014MC*	P-ch,- 40 V/-20 A, 18.7 mΩ, Tch=175°C	**
			XPN9R614MC	P-ch,- 40 V/-40 A, 9.6 mΩ, Tch=175°C	AEC-Q101
	System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100

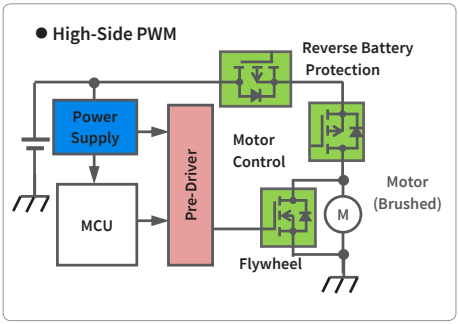
* Under Development (The specification is subject to change without notice.), ** Under Consideration

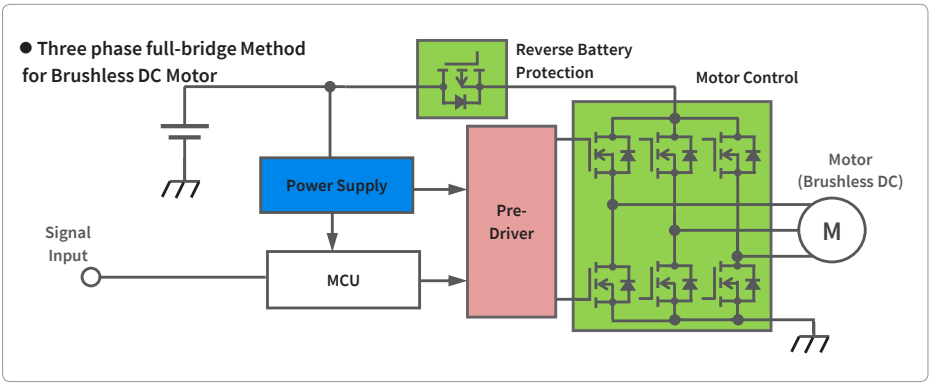
Application **2. Power Train**

2-5. Cooling Fan

System Block







Recommended Devices

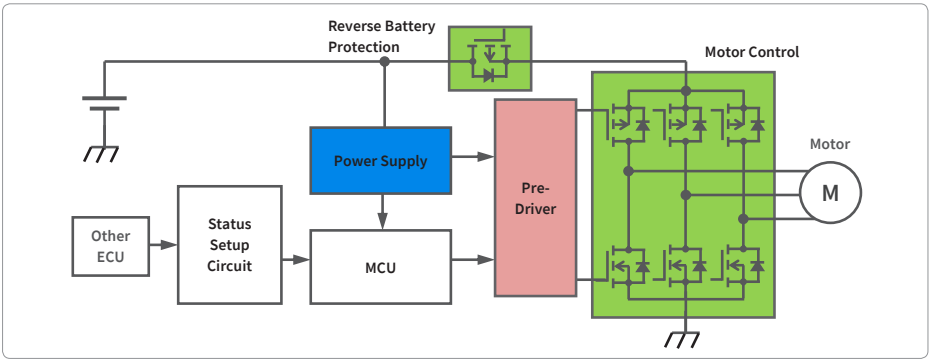
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control Reverse Battery Protection	MOSFET	DPAK+	TK1R4S04PB	N-ch, 40 V/120 A, 1.35 mΩ, Tch=175°C	AEC-Q101
			TK90S06N1L	N-ch, 60 V/90 A, 3.3 mΩ, Tch=175°C	AEC-Q101
		D2PAK+	TK1R5R04PB	N-ch, 40 V/160 A, 1.5 mΩ, Tch=175°C	AEC-Q101
		TO-220SM(W)	TK200F04N1L	N-ch, 40 V/200 A, 0.9 mΩ, Tch=175°C	AEC-Q101
			TKR74F04PB	N-ch, 40 V/250 A, 0.74 mΩ, Tch=175°C	AEC-Q101
			XK4R0F10QB*	N-ch, 100 V/60 A, 4.0 mΩ, Tch=175°C	**
			XK1R9F10QB	N-ch, 100 V/160 A, 1.92 mΩ, Tch=175°C	AEC-Q101
Pre-Driver	IPD	WQFN32	TPD7212F	Three-Phase Full Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150°C	**
	MCD	SSOP24	TB9061AFNG	3Phase Brushless Sensor-less Pre-Driver, T_{opr}: -40 to 125°C	AEC-Q100
			TB9062FNG	Three Phase Brushless Sensor-less Pre-Driver, T_{opr}: -40 to 125°C Automatic PWM duty control at startup, Automatic soft speed changing control	-
		LQFP64	TB9080FG	Pre-driver for sine-wave control T_{opr}: -40 to 125°C Motor RPM feedback, auto lead angle correction	AEC-Q100
	Logic IC	TSSOP20B	TC74VHC9363FT	Dual 3 bit buffer for control signal of High-side and Low-side circuits. T_{opr}=-40 to 125°C	AEC-Q100
			TC74VHC9364FT		
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T_{opr}: -40 to 125°C	AEC-Q100
	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V/-3 A, $V_{CE(sat)}$=-1.7 V, T_j=175°C For external of TB9005FNG	AEC-Q101

* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application **2. Power Train**

2-6. Various Pump (Brushless Motor)

System Block



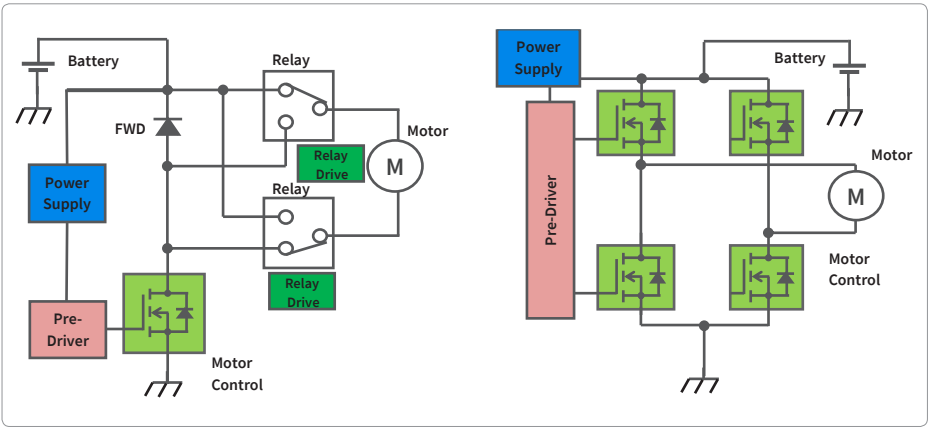
Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control, Reverse Battery Protection	MOSFET	DPAK+	TK35S04K3L	N-ch, 40 V/35 A, 10.3 mΩ, Tch=175°C	AEC-Q101
			TK65S04N1L	N-ch, 40 V/65 A, 4.3 mΩ, Tch=175°C	AEC-Q101
			TJ40S04M3L	P-ch, -40 V/-40 A, 9.1 mΩ, Tch=175°C	AEC-Q101
			TJ60S04M3L	P-ch, -40 V/-60 A, 6.3 mΩ, Tch=175°C	AEC-Q101
Pre-Driver	IPD (Pre-Driver)	WQFN32	TPD7212F	Three-Phase Full Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150°C	AEC-Q100
		SSOP16	TPD7213FN*	Half-Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150°C	**
	MCD	SSOP24	TB9061AFNG	Three-Phase Brushless Sensor-less Pre-Driver, T_{opr}: -40 to 125°C	AEC-Q100
			TB9062FNG	Three-Phase Brushless Sensor-less Pre-Driver, T_{opr}: -40 to 125°C Automatic PWM duty control at startup, Automatic soft speed changing control	-
		SSOP24	TB9067FNG	Pre-drivers of P-ch/N-ch T_{opr}: -40 to 125°C with 120 degree commutation,	-
		LQFP64	TB9080FG	Pre-driver for sine-wave control T_{opr}: -40 to 125°C Motor RPM feedback, auto lead angle correction	AEC-Q100
	Logic IC	TSSOP20B	TC74VHC9363FT	Dual 3 bit buffer for control signal of High-side and Low-side circuits. T_{opr}=-40 to 125°C	AEC-Q100
			TC74VHC9364FT		
Power Supply	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V/-3 A, $V_{CE(sat)}$=1.7 V, T_j=175°C For external of TB9005FNG	AEC-Q101
	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T_{opr}: -40 to 125°C	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

3-1. Wiper

System Block



Recommended Devices

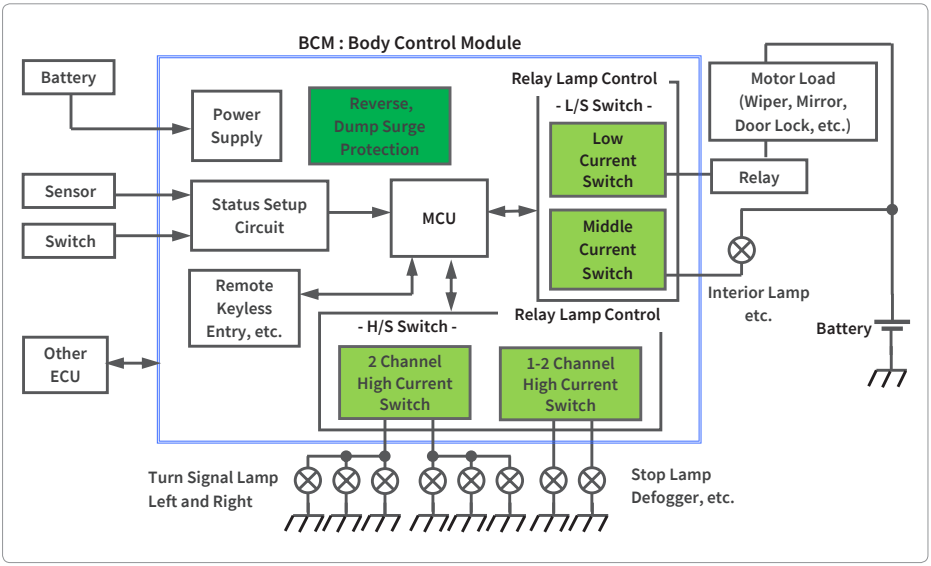
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control	MOSFET	DPAK+	TJ30S06M3L	P-ch, -60 V/-30 A, 21.8 mΩ, Tch=175 °C	AEC-Q101
			TK8S06K3L	N-ch, 60 V/8 A, 54 mΩ, Tch=175 °C	AEC-Q101
		TSON Advance (WF)	XPN3R804NC	N-ch, 40 V/40 A, 3.8 mΩ, Tch=175 °C	AEC-Q101
Relay drive	MOSFET	SOT-23F	SSM3K337R	Active Clamp N-ch, 38 V/2 A, 0.15 Ω	AEC-Q101
			SSM3K347R	Active Clamp N-ch, 38 V/2 A, 0.34 Ω	AEC-Q101
			SSM3K357R	N-ch, 60 V/0.65 A, 1.8 Ω	AEC-Q101
		TSOP6F	SSM6N357R	N-chx2, 60 V/0.65 A, 1.8 Ω	AEC-Q101
		UFM	SSM3H137TU	Active Clamp N-ch, 34 V/2 A, 0.24 Ω	AEC-Q101
Pre-Driver	IPD (Pre-Driver)	WQFN32	TPD7212F	Three Phase Full Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150 °C	AEC-Q100
		SSOP16	TPD7213FN*	Half-Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150°C	**
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T_{opr}: -40 to 125 °C	AEC-Q100
	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V/-3 A, $V_{CE(sat)}$=1.7 V, T_j=175 °C	AEC-Q101

* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application **3. Body Control**

3-2. Body Control Module (BCM)

System Block



Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Relay, Lamp Control	IPD (HSS)	WSON10	TPD1055FA	High-side 1 ch, $V_{DD(opr)}$= 5 to 18 V, I_O=3 A, 0.12 Ω T_{opr}: -40 to 125°C	AEC-Q100
	IPD (LSS)	PS-8	TPD1044F	Low-side 1 ch, V_{DS}=41 V, I_O=1 A, 0.6 Ω T_{opr}: -40 to 125°C	AEC-Q100
		WSON10	TPD1058FA	Low-side 1 ch, V_{DS}=40 V, I_O=6 A, 0.1 Ω T_{opr}: -40 to 125°C	**
	MOSFET	SOT-23F	SSM3K2615R	N-ch, 60 V/2 A, 0.3 Ω	AEC-Q101
			SSM3K337R	Active Clamp N-ch, 38 V/2 A, 0.15 Ω	AEC-Q101
			SSM3K347R	Active Clamp N-ch, 38 V/2 A, 0.34 Ω	AEC-Q101
			SSM3K357R	N-ch, 60 V/0.65 A, 1.8 Ω	AEC-Q101
		TSOP6F	SSM6N357R	N-chx2, 60 V/0.65 A, 1.8 Ω	AEC-Q101
		UFM	SSM3H137TU	Active Clamp N-ch, 34 V/2 A, 0.24 Ω	AEC-Q101
Reverse Dump Surge Protection	MOSFET	DPAK+	TK60S10N1L	N-ch, 100 V/60 A, 6.11 mΩ, Tch=175°C	AEC-Q101
			TJ60S06M3L	P-ch, -60 V/-60 A, 11.2 mΩ, Tch=175°C	AEC-Q101
	IPD (Pre-Driver)	SSOP16	TPD7106F	High Side 1 ch N-ch Pw-MOSFET Gate Driver T_{opr}: -40 to 150°C	AEC-Q100
Control Signal Line	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF2B29FU	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF2B36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF3D29FU	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF3D36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		S-Mini (Dual)	DF3D18F*	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	**
			DF3D29F*	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	**
			DF3D36F*	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	**
	MCD	P-QFN28	TB9051FTG	1ch H-Bridge driver(P-ch+N-ch), Iout=±5 A, T_{opr} : -40 to 125°C	AEC-Q100
	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T_{opr}: -40 to 125°C	AEC-Q100

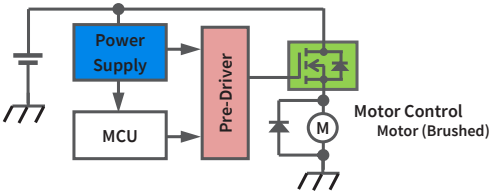
* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application **3. Body Control**

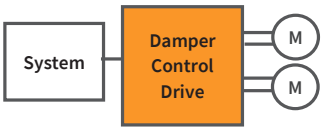
3-3. Air Conditioner (HVAC)

System Block

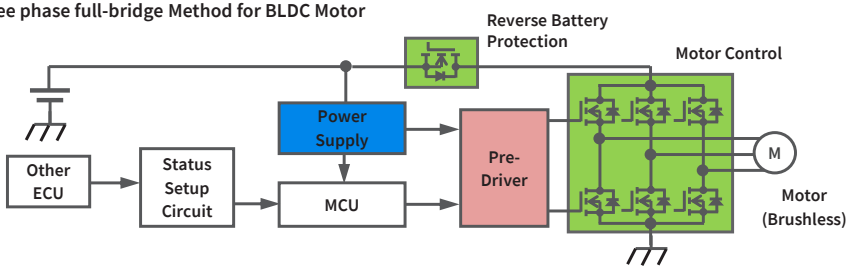
● PWM Control Method for Brushed Motor



● Damper



● Three phase full-bridge Method for BLDC Motor



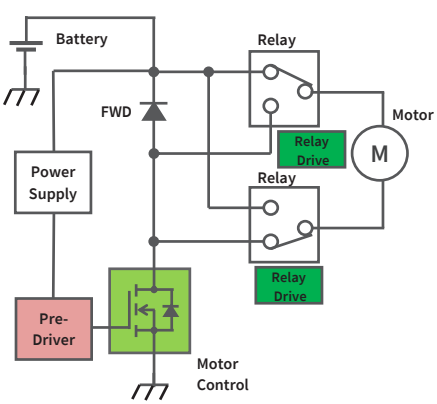
Recommended Devices

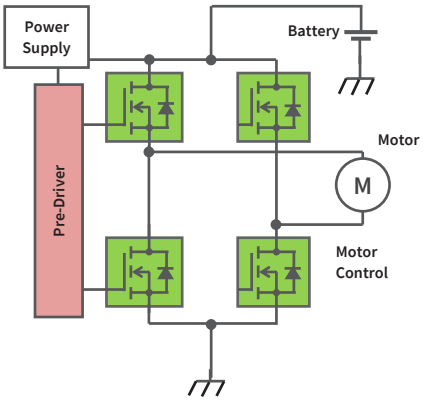
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control, Reverse Battery Protection	MOSFET	DPAK+	TK65S04N1L	N-ch, 40 V/65 A, 4.3 mΩ, Tch=175°C	AEC-Q101
			TK1R4S04PB	N-ch, 40 V/120 A, 1.35 mΩ, Tch=175°C	AEC-Q101
			TK60S06K3L	N-ch, 60 V/60 A, 8.0 mΩ, Tch=175°C	AEC-Q101
			TK90S06N1L	N-ch, 60 V/90 A, 3.3 mΩ, Tch=175°C	AEC-Q101
		TO-220SM(W)	TK1R4F04PB	N-ch, 40 V/160 A, 1.35 mΩ, Tch=175°C	AEC-Q101
			XK1R9F10QB	N-ch, 100 V/160 A, 1.92 mΩ, Tch=175°C	AEC-Q101
Pre-Driver/ Driver	IPD (Pre-Driver)	WQFN32	TPD7212F	Three Phase Full Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150°C	AEC-Q100
	MCD	LQFP64	TB9080FG	Pre-driver for sine-wave control T_{opr}: -40 to 125°C Motor RPM feedback, auto lead angle correction	AEC-Q100
		P-VQFN28	TB9120AFTG	2-phase bipolar stepping motor driver with a clock input interface, T_{opr}: -40 to 125°C	AEC-Q100
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T_{opr}: -40 to 125°C	AEC-Q100
	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V/-3 A, $V_{CE(sat)}$=-1.7 V, T_j=175°C For external of TB9005FNG	AEC-Q101
Damper Control Driver	MCD	SSOP24	TB9101FNG	2-CH H-bridge driver, Diagnostic function, standby function, T_{opr}: -40 to 125°C	AEC-Q100
			TB9102FNG	6-CH Half/3-CH H-bridge driver, SPI communications, Diagnostic function, T_{opr}: -40 to 125°C	AEC-Q100
			TB9056FNG	LIN 1.3 Slave (Classic Check sum) H-Bridge driver	-
			TB9058FNG	Built-in 1ch H-bridge, communicate with LIN 2.0 master, as a slave IC	AEC-Q100

Application **3. Body Control**

3-4. Power Door/EPB

System Block





Recommended Devices

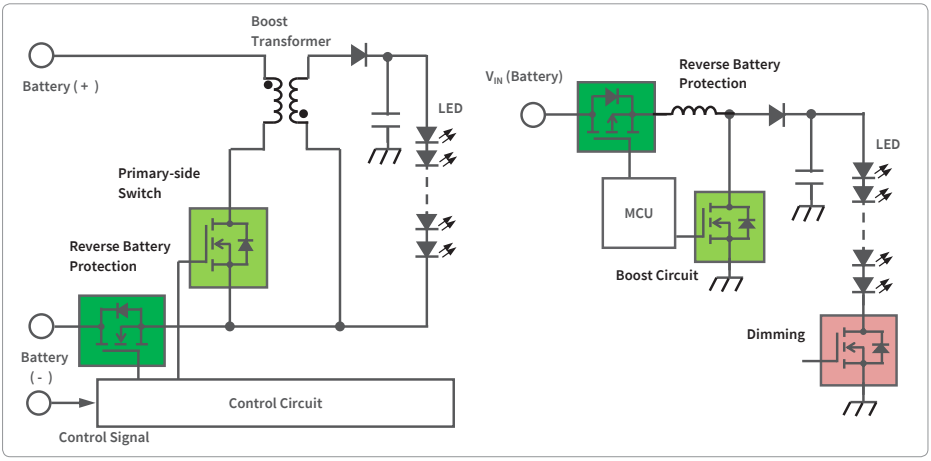
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control	MOSFET	DPAK+	TK65S04N1L	N-ch, 40 V/65 A, 4.3 mΩ, Tch=175°C	AEC-Q101
			TK1R4S04PB	N-ch, 40 V/120 A, 1.35 mΩ, Tch=175°C	AEC-Q101
			TK90S06N1L	N-ch, 60 V/90 A, 3.3 mΩ, Tch=175°C	AEC-Q101
			TJ80S04M3L	P-ch, -40 V/-80 A, 5.2 mΩ, Tch=175°C	AEC-Q101
		TO-220SM(W)	TK1R4F04PB	N-ch, 40 V/160 A, 1.35 mΩ, Tch=175°C	AEC-Q101
			TK200F04N1L	N-ch, 40 V/200 A, 0.9 mΩ, Tch=175°C	AEC-Q101
Relay drive	MOSFET	SOT-23F	SSM3K337R	Active Clamp N-ch, 38 V/2 A, 0.15 Ω	AEC-Q101
			SSM3K347R	Active Clamp N-ch, 38 V/2 A, 0.34 Ω	AEC-Q101
			SSM3K357R	N-ch, 60 V/0.65 A, 1.8 Ω	AEC-Q101
		TSOP6F	SSM6N357R	N-chx2, 60 V/0.65 A, 1.8 Ω	AEC-Q101
		UFM	SSM3H137TU	Active Clamp N-ch, 34 V/2 A, 0.24 Ω	AEC-Q101
Driver/Pre-Driver	IPD (Pre-Driver)	WQFN32	TPD7212F	Three Phase Full Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150°C	AEC-Q100
		PS-8	TPD7211F	Half-Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 125°C	-
		SSOP16	TPD7213FN*	Half-Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150°C	**
	MCD	HTSSOP48	TB9052FNG	H-Bridge Pre-Driver, Current sensor, T_{opr}: -40 to 125°C	AEC-Q100
		LQFP48	TB9057FG	H-Bridge Pre-Driver, Current sensor, T_{opr}: -40 to 125°C	AEC-Q100
		LQFP64	TB9080FG	Pre-driver for sine-wave control T_{opr}: -40 to 125°C Motor RPM feedback, auto lead angle correction	AEC-Q100
		LQFP64	TB9081FG	Three-Phase Brushless Motor Pre-driver T_{opr}: -40 to 125°C 5-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits	AEC-Q100
		P-VQFN48	TB9083FTG*	3-Phase Brushless Motor Pre-driver 3-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits, T_j=175°C	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application **3. Body Control**

3-5. LED Head Lamp

System Block



Recommended Devices

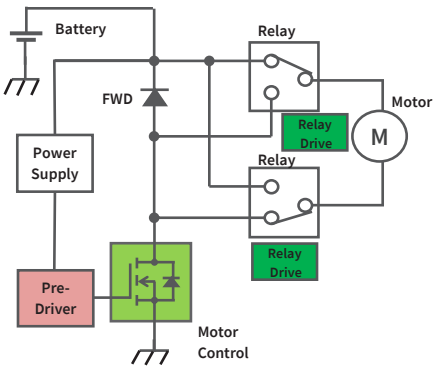
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Booster Circuit	MOSFET	DPAK+	TK25S06N1L	N-ch, 60 V/25 A, 18.5 mΩ, Tch=175°C	AEC-Q101
			TK90S06N1L	N-ch, 60 V/90 A, 3.3 mΩ, Tch=175°C	AEC-Q101
			TK60S10N1L	N-ch, 100 V/60 A, 6.11 mΩ, Tch=175°C	AEC-Q101
Reverse Battery Protection	MOSFET	DPAK+	TK35S04K3L	N-ch, 40 V/35 A, 10.3 mΩ, Tch=175°C	AEC-Q101
			TK25S06N1L	N-ch, 60 V/25 A, 18.5 mΩ, Tch=175°C	AEC-Q101
			TJ40S04M3L	P-ch, -40V/-40A, 9.1mΩ, Tch=175°C	AEC-Q101
			TJ30S06M3L	P-ch, -60 V/-30 A, 21.8 mΩ, Tch=175°C	AEC-Q101
		SOT-23F	SSM3K341R	N-ch, 60 V/6 A, 36 mΩ, Tch=175°C	AEC-Q101
			SSM3K361R	N-ch, 100 V/3.5 A, 69 mΩ, Tch=175°C	AEC-Q101
			SSM3J356R	P-ch, -60 V/-2 A, 300 mΩ, Tch=150°C	AEC-Q101
			SSM3J351R	P-ch, -60 V/-3.5 A, 134 mΩ, Tch=150°C	AEC-Q101
		TSOP6F	SSM6K804R*	N-ch, 40 V/12 A, 7 mΩ, Tch=175°C	**
			SSM6K809R	N-ch, 60 V/6 A, 36 mΩ, Tch=175°C	AEC-Q101
			SSM6K810R	N-ch, 100 V/3.5 A, 69 mΩ, Tch=175°C	AEC-Q101
			SSM6K819R	N-ch, 100 V/10 A, 25.8 mΩ, Tch=175°C	AEC-Q101
			SSM6J808R	P-ch, -40V/-7 A, 35 mΩ, Tch=175°C	AEC-Q101
			SSM6J811R*	P-ch, -60V/-4 A, 164 mΩ, Tch=175°C	**
Dimming	MOSFET	SOT-23F	SSM3J356R	P-ch, -60 V/-2 A, 300 mΩ	AEC-Q101
			SSM3J351R	P-ch, -60 V/-2 A, 134 mΩ	AEC-Q101
			SSM3K341R	N-ch, 60 V/6 A, 36 mΩ, Tch=175°C	AEC-Q101
			SSM3K361R	N-ch, 100 V/3.5 A, 69 mΩ, Tch=175°C	AEC-Q101
		TSOP6F	SSM6K809R	N-ch, 60 V/6 A, 36 mΩ, Tch=175°C	AEC-Q101
			SSM6K810R	N-ch, 100 V/3.5 A, 69 mΩ, Tch=175°C	AEC-Q101
			SSM6K819R	N-ch, 100 V/10 A, 25.8 mΩ, Tch=175°C	AEC-Q101
			SSM6J811R*	P-ch, -60V/-4 A, 134 mΩ, Tch=175°C	**
Control Signal Line	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF2B29FU	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF2B36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF3D29FU	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF3D36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		S-Mini (Dual)	DF3D18F*	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	**
			DF3D29F*	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	**
			DF3D36F*	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	**
	MCD	P-VQFN28	TB9120AFTG	2-phase bipolar stepping motor driver with a clock input interface, T_{opr}: -40 to 125°C	AEC-Q100

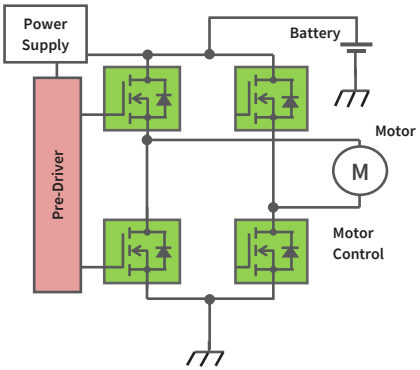
* Under Development (The specification is subject to change without notice.), ** Under Consideration

Application **4. Active / Passive Safety**

4-1. Pre-Crash Seat Belt

System Block





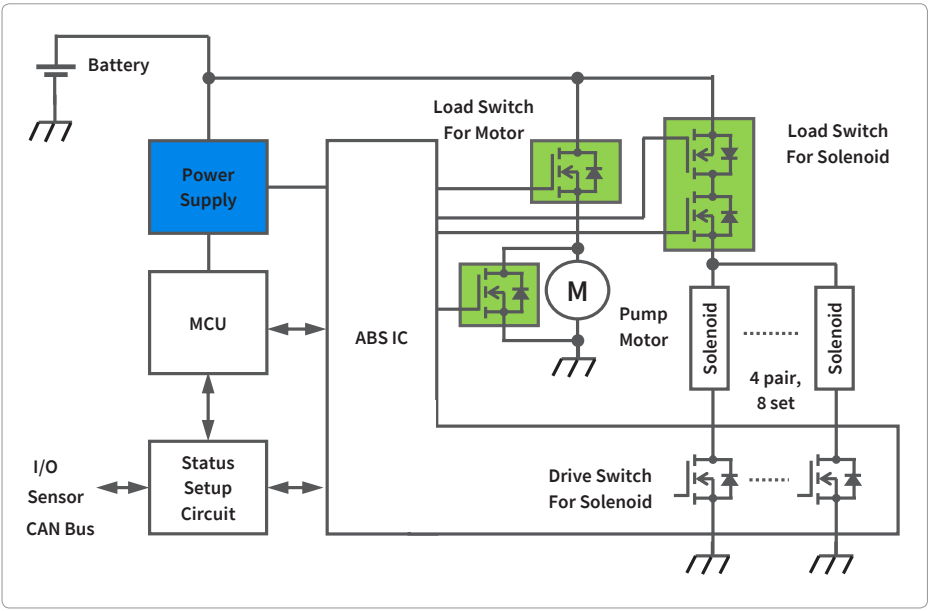
Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control	MOSFET	DPAK+	TK65S04N1L	N-ch, 40 V/65 A, 4.3 mΩ, Tch=175°C	AEC-Q101
			TK1R4S04PB	N-ch, 40 V/120 A, 1.35 mΩ, Tch=175°C	AEC-Q101
			TK90S06N1L	N-ch, 60 V/90 A, 3.3 mΩ, Tch=175°C	AEC-Q101
			TJ80S04M3L	P-ch, -40 V/-80 A, 5.2 mΩ, Tch=175°C	AEC-Q101
		TO-220SM(W)	TK1R4F04PB	N-ch, 40 V/160 A, 1.35 mΩ, Tch=175°C	AEC-Q101
			TK200F04N1L	N-ch, 40 V/200 A, 0.9 mΩ, Tch=175°C	AEC-Q101
			TJ200F04M3L	P-ch, -40 V/-200 A, 1.8 mΩ, Tch=175°C	AEC-Q101
Relay drive	MOSFET	SOT-23F	SSM3K337R	Active Clamp N-ch, 38 V/2 A, 0.15 Ω	AEC-Q101
			SSM3K347R	Active Clamp N-ch, 38 V/2 A, 0.34 Ω	AEC-Q101
			SSM3K357R	N-ch, 60 V/0.65 A, 1.8 Ω	AEC-Q101
		TSOP6F	SSM6N357R	N-chx2, 60 V/0.65 A, 1.8 Ω	AEC-Q101
		UFM	SSM3H137TU	Active Clamp N-ch, 34 V/2 A, 0.24 Ω	AEC-Q101
Driver/ Pre-Driver	IPD (Pre-Driver)	WQFN32	TPD7212F	Three Phase Full Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150°C	AEC-Q100
		PS-8	TPD7211F	Half-Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 125°C	-
		SSOP16	TPD7213FN*	Half-Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150°C	**
	MCD	HTSSOP48	TB9052FNG	H-Bridge Pre-Driver, Current sensor, T_{opr}: -40 to 125°C	AEC-Q100
		LQFP48	TB9057FG	H-Bridge Pre-Driver, Current sensor, T_{opr}: -40 to 125°C	AEC-Q100

* Under Development (The specification is subject to change without notice.), ** Under Consideration

4-2. Brake (ABS, ESC)

System Block



Recommended Devices

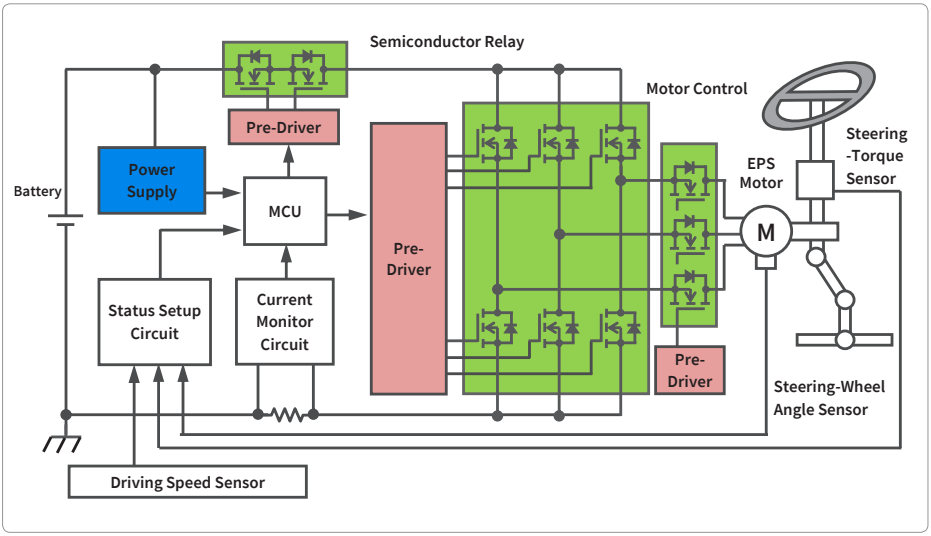
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Switch for Pump Motor, Solenoid	MOSFET	DPAK+	TK65S04N1L	N-ch, 40 V/65 A, 4.3 mΩ, Tch=175°C	AEC-Q101
			TK1R4S04PB	N-ch, 40 V/120 A, 1.35 mΩ, Tch=175°C	AEC-Q101
			TK80S06K3L	N-ch, 60 V/80 A, 5.5 mΩ, Tch=175°C	AEC-Q101
			TK90S06N1L	N-ch, 60 V/90 A, 3.3 mΩ, Tch=175°C	AEC-Q101
		TO-220SM(W)	TKR74F04PB	N-ch, 40 V/250 A, 0.74mΩ, Tch=175°C	AEC-Q101
		SOP Advance (WF)	TPH1R104PB	N-ch, 40 V/120 A, 1.14 mΩ, Tch=175°C	AEC-Q101
		DSOP Advance (WF)M	TPW1R104PB	N-ch, 40 V/120 A, 1.14 mΩ, Tch=175°C	AEC-Q101
Driver/ Pre-Driver	MCD	LQFP64	TB9081FG	Three-Phase Brushless Motor Pre-driver T_{opr}: -40 to 125°C 5-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits	AEC-Q100
		P-VQFN48	TB9083FTG*	3-Phase Brushless Motor Pre-driver 3-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits, T_j=175°C	AEC-Q100
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T_{opr}: -40 to 125°C	AEC-Q100
	System Power Supply Ics	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100

* Under development (The specification is subject to change without notice.)

Application **4. Active / Passive Safety**

4-3. Electric Power Steering (EPS)

System Block



Recommended Devices

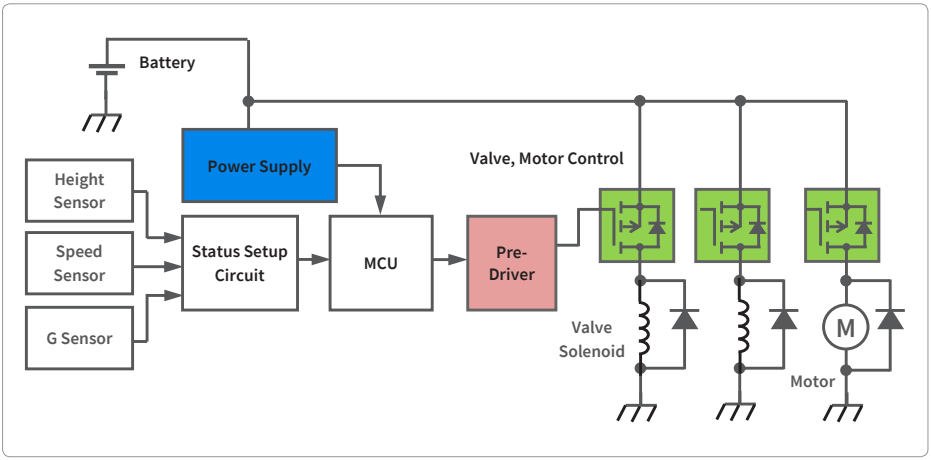
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Motor Control, Semiconductor Relay	MOSFET	TO-220SM(W)	TKR74F04PB	N-ch, 40 V/250 A, 0.74 mΩ, Tch=175°C	AEC-Q101
		SOP Advance (WF)	TPH1R104PB	N-ch, 40 V/120 A, 1.14 mΩ, Tch=175°C	AEC-Q101
			TPHR7904PB	N-ch, 40 V/150 A, 0.79 mΩ, Tch=175°C	AEC-Q101
		DSOP Advance (WF)M	TPW1R104PB	N-ch, 40 V/120 A, 1.14 mΩ, Tch=175°C	AEC-Q101
		DSOP Advance (WF)L	TPWR7904PB	N-ch, 40 V/150 A, 0.79 mΩ, Tch=175°C	AEC-Q101
Pre-Driver	IPD (Pre-Driver)	WQFN32	TPD7212F	Three Phase Full Bridge Pw-MOSFET Gate Driver, T_{opr}: -40 to 150°C	AEC-Q100
		PS-8	TPD7104AF	High Side N-ch Pw-MOSFET Gate Driver, 1ch, T_{opr}: -40 to 125°C	AEC-Q100
		SSOP16	TPD7106F	High Side N-ch Pw-MOSFET Gate Driver, 1ch, T_{opr}: -40 to 150°C	AEC-Q100
		WSON10A	TPD7107F	High Side N-ch Pw-MOSFET Gate Driver, 1ch, T_{opr}: -40 to 125°C	AEC-Q100
	MCD	HTSSOP48	TB9052FNG	H-Bridge Pre-Driver, Current sensor, T_{opr}: -40 to 125°C	AEC-Q100
		LQFP48	TB9057FG	H-Bridge Pre-Driver, Current sensor, T_{opr}: -40 to 125°C	AEC-Q100
		LQFP64	TB9081FG	Three-Phase Brushless Motor Pre-driver T_{opr}: -40 to 125°C 5-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits	AEC-Q100
		P-VQFN48	TB9083FTG*	3-Phase Brushless Motor Pre-driver 3-channel safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits, T_j=175°C	AEC-Q100
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T_{opr}: -40 to 125°C	AEC-Q100
	System Power Supply Ics	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
	MOSFET	DPAK+	TJ8S06M3L	P-ch, -60 V/-8 A, 104 mΩ, Tch=175°C For external of TB9042FTG	AEC-Q101
		SOT-23F	SSM3K341R	Nch, 60 V/6 A, 36 mΩ, Tch=175°C For external of TB9044FTG	AEC-Q101
	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V/-3 A, $V_{CE(sat)}$=1.7 V, T_j=175°C For external of TB9005FNG	AEC-Q101

* Under Development (The specification is subject to change without notice.)

Application **4. Active / Passive Safety**

4-4. Electric Control Suspension

System Block

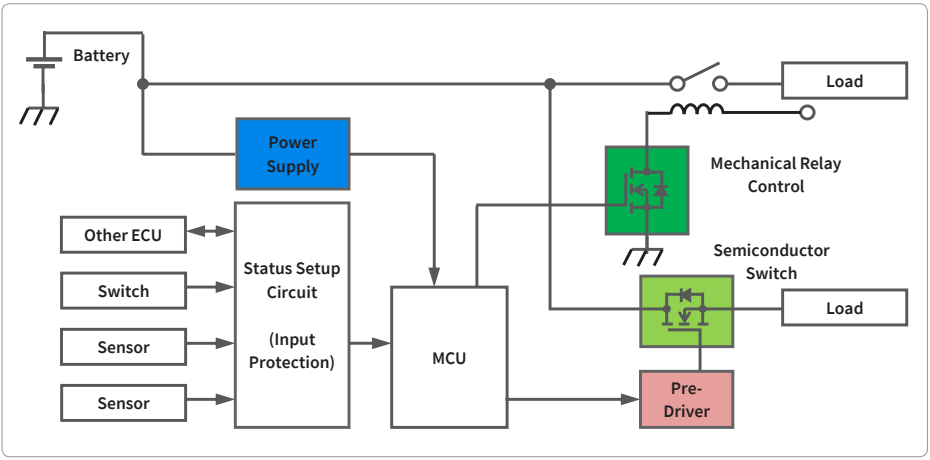


Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Solenoid, Motor Control	MOSFET	TSON Advance (WF)	XPN7R104NC	N-ch, 40 V/20 A, 7.1 mΩ, Tch=175°C	AEC-Q101
			XPN9R614MC	P-ch,- 40 V/-40 A, 9.6 mΩ, Tch=175°C	AEC-Q101
		SOT-23F	SSM3K2615R	N-ch, 60 V/2 A, 300 mΩ	AEC-Q101
			SSM3K318R	N-ch, 60 V/2.5 A, 107 mΩ	AEC-Q101
			SSM3K341R	N-ch, 60 V/6 A, 36 mΩ, Tch=175°C	AEC-Q101
		TSOP6F	SSM6K809R	N-ch, 60 V/6 A, 36 mΩ, Tch=175°C	AEC-Q101
			SSM6K810R	N-ch, 100 V/3.5 A, 69 mΩ, Tch=175°C	AEC-Q101
			SSM6K819R	N-ch, 100 V/10 A, 25.8 mΩ, Tch=175°C	AEC-Q101
	Diode	S-FLAT	CRG07	400 V/0.7 A, V_{FM}=1.1 V@0.7 A, T_j=175°C	AEC-Q101
Pre-Driver	IPD (Pre-Driver)	PS-8	TPD7104AF	High Side N-ch Pw-MOSFET Gate Driver, 1ch, T_{opr}: -40 to 125°C	AEC-Q100
Power Supply	System Power Supply ICs	HTSSOP48	TB9044AFNG	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100
			TB9045FNG series	Multiple-output regulator for CPU Watchdog timer, SPI I/F	AEC-Q100

5-1. Junction Box

System Block



Recommended Devices

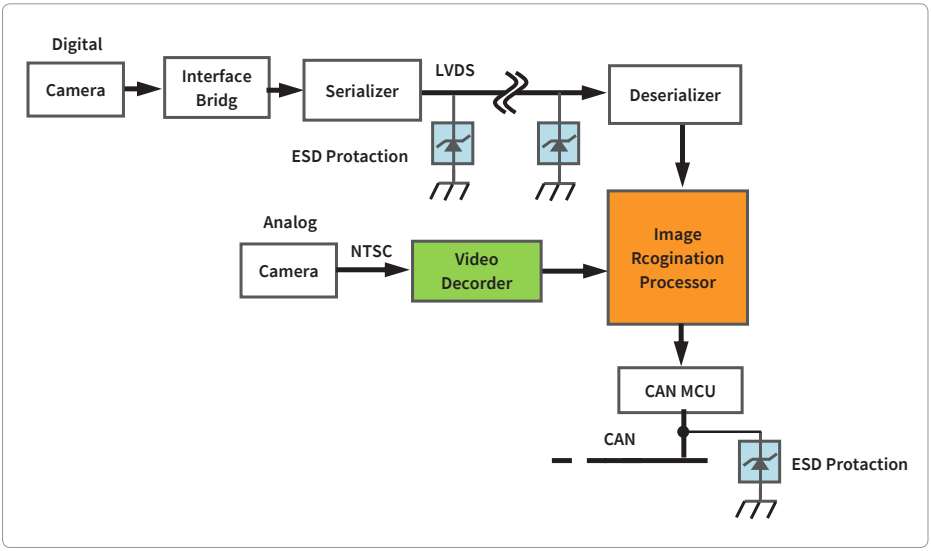
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Mechanical Relay Control	MOSFET	SOT-23F	SSM3K337R	Active Clamp N-ch, 38 V/2 A, 0.15 Ω	AEC-Q101
			SSM3K347R	Active Clamp N-ch, 38 V/2 A, 0.34 Ω	AEC-Q101
			SSM3K357R	N-ch, 60 V/0.65 A, 1.8 Ω	AEC-Q101
		TSOP6F	SSM6N357R	N-chx2, 60 V/0.65 A, 1.8 Ω	AEC-Q101
		UFM	SSM3H137TU	Active Clamp N-ch, 34 V/2 A, 0.24 Ω	AEC-Q101
Semiconductor Relay	MOSFET	TO-220SM(W)	TKR74F04PB	N-ch, 40 V/250 A, 0.74mΩ, Tch=175°C	AEC-Q101
		SOP Advance (WF)	TPHR7904PB	N-ch, 40 V/150 A, 0.79 mΩ, Tch=175°C	AEC-Q101
Pre-Driver	IPD (Pre-Driver)	PS-8	TPD7104AF	High Side N-ch Pw-MOSFET Gate Driver, 1ch, T_{opr}: -40 to 125°C	AEC-Q100
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T_{opr}: -40 to 125°C	AEC-Q100
	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V/-3 A, $V_{CE(sat)}$=1.7 V, T_j=175°C For external of TB9005FNG	AEC-Q101
Control Signal Line	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF2B29FU	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF2B36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF3D29FU	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF3D36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		S-Mini (Dual)	DF3D18F*	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	**
			DF3D29F*	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	**
			DF3D36F*	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	**

* Under development (The specification is subject to change without notice.), ** Under Consideration

Application **5. Other**

5-2. Advanced Driver Assistance System (ADAS)

System Block



Recommended Devices

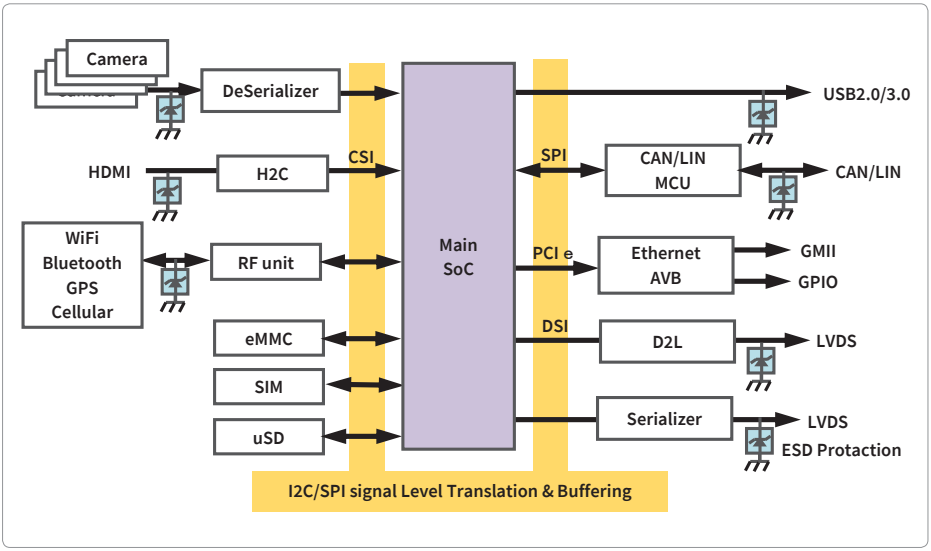
Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
CAN LINE ESD protection	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF2B29FU	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF2B36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF3D29FU	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF3D36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		S-Mini (Dual)	DF3D18F*	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	**
			DF3D29F*	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	**
			DF3D36F*	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	**
LVDS LINE ESD protection		SOD-923 (Single)	DF2S5M4FS	V_{RMW}=3.6 V, C_t=0.45 pF, V_{ESD}=±20 kV, Unidirectional	AEC-Q101
			DF2S6M4FS	V_{RMW}=5.5 V, C_t=0.45 pF, V_{ESD}=±20 kV, Unidirectional	AEC-Q101
			DF2B20M4FS*	V_{RMW}=18.5 V, C_t=0.25 pF, V_{ESD}=±15 kV, Bidirectional	**
Image recognition LSI	Visconti5	PFBGA621	TMPV7706XBG*	CA53 x8, CR4 x4, DSP x4, Video input x2, Deep Neural Network IP, Optical flow, Stereo matching, AKAZE, ISP, Affine transformation, Enhanced CoHOG, Matching, Pyramid	AEC-Q100
	Visconti5	PFBGA1018	TMPV7708XBG*	CA53 x8, CR4 x4, DSP x4, Video input x6, Deep Neural Network IP, Optical flow, Stereo matching, AKAZE, ISP, Affine transformation, Enhanced CoHOG, Matching, Pyramid	
	Visconti4	PFBGA796	TMPV7608XBG	MPE x8, Video input x8(4ch selection in 8ch input) Affine transformation, Filter, Histogram, HOG, Enhanced CoHOG, Matching, Pyramid, SfM	
Video Decoder IC	Video Decoder	LQFP80	TC90105FG	Video decoder x2, 2.5 V Regurator, Image quality adjustment functions, Image quality improvement functions, ITU-R BT.656 output	-
		LQFP64	TC90107FG	Video decoder x1, 2.5 V Regurator, Image quality adjustment functions, Image quality improvement functions, ITU-R BT.656 output	

* Under development (The specification is subject to change without notice.), ** Under Consideration

Application **5. Other**

5-3. In Vehicle infotainment (IVI)

System Block



Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
CAN/LIN LINE ESD protection	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF2B29FU	V_{RMW}=24 V, C_t= 9pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF2B36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF3D29FU	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF3D36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		S-Mini (Dual)	DF3D18F*	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	**
			DF3D29F*	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	**
			DF3D36F*	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	**
LVDS LINE ESD protection		SOD-923 (Single)	DF2S5M4FS	V_{RMW}=3.6 V, C_t=0.45 pF, V_{ESD}=±20 kV, Unidirectional	AEC-Q101
			DF2S6M4FS	V_{RMW}=5.5 V, C_t=0.45 pF, V_{ESD}=±20 kV, Unidirectional	AEC-Q101
			DF2B20M4FS*	V_{RMW}=18.5 V, C_t=0.25 pF, V_{ESD}=±15 kV, Bidirectional	**
Power Supply	Voltage Reg.	SSOP20	TB9005FNG	5 V Reg., External Transistor type, Watchdog timer, T_{opr}: -40 to 125°C	AEC-Q100
	Bipolar TR	New PW-Mold	TTB002	PNP, -60 V/-3 A, $V_{CE(sat)}$=1.7 V @3 A, T_j=175°C For external of TB9005FNG	AEC-Q101
Signal Level Translation & Buffering	Logic IC	TSSOP16B	74LV4T125FT	4-Bit Single Power Supply Unidirection Level Shifter IC (Level Up and Down).Quadruple Buffer With 3-State Output. e.g. <UP Translation> 1.8V→3.3V@Vcc=3.3V 3.3V→5.0V@Vcc=5.0V <Down translation> 3.3V→1.8V@Vcc=1.8V 5.0V→3.3V@Vcc=3.3V	AEC-Q100 #
			74LV4T126FT		AEC-Q100 #
		US16	74LV4T125FK		AEC-Q100 #
			74LV4T126FK		AEC-Q100 #
		TSSOP16B	TC7MP3125FT	4-Bit Dual-Supply Bus Transceiver. Bi-directional transmission possible by DIR terminal control. Translation voltage range is 1.1 to 3.6 V. (TC7MPN series are Low Noise Type.)	AEC-Q100 #
			TC7MPN3125FT		AEC-Q100 #
		US16	TC7MP3125FK		AEC-Q100 #
			TC7MPN3125FK		AEC-Q100 #
		US8	TC7WP3125FK*	2-Bit Dual-Supply Bus Buffer. Uni-directional type level up conversion IC. (TC7WPN series is Low Noise Type.)	**
			TC7WPN3125FK*		**

* Under development (The specification is subject to change without notice.), ** Under Consideration
# Compliant with the AEC-Q100(Grade1) reliability requirements

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
Signal Level Translation & Buffering	Logic IC	US8	7UL2G125/126FK	2-Bit Buffer with Unidirection Level shift function. V_{CC} = 0.9V to 3.6V, 3.6 V tolerant inputs	**
			7UL2T125/126FK	2-Bit Buffer with Unidirection Level shift function. V_{CC} = 2.3 V to 3.6V, V_{IH} = 1.2 V(min)	**
		USV	7UL1G xx FU series	1-Bit Gate with Unidirection Level shift function. V_{CC} = 0.9V to 3.6V, 3.6 V tolerant inputs	**
			7UL1T xx FU series	1-Bit Gate with Unidirection Level shift function. V_{CC} = 2.3 V to 3.6V, V_{IH} = 1.2 V(min)	**
Signal Level Translation Bus Switch	Bus Switch	TSSOP20	TC7MPB9307FT	8-Bit Dual Supply Bus Switch. Bi-directional transmission possible without direction control. Translation voltage range: 1.8 to 5.0 V. Low Active.	**
		US20	TC7MPB9307FK		**
		TSSOP14	TC7QPB9306FT	4-Bit Dual Supply Bus Switch. Bi-directional transmission possible without direction control. Translation voltage range: 1.8 to 5.0 V. 9306: High Active, 9307: Low Active.	**
			TC7QPB9307FT		**
		US14	TC7QPB9306FK		**
			TC7QPB9307FK		**
		US8	TC7WPB9306FK	2-Bit Dual Supply Bus Switch. Bi-directional transmission possible without direction control. Translation voltage range: 1.8 to 5.0 V. 9306: High Active, 9307: Low Active.	**
			TC7WPB9307FK		**
Ethernet Bridge IC	Bridge IC	PLFBGA170	TC9560XBG	Ethernet AVB, PCIe I/F Gen2.0(5 GT/s), Endpoint, Single lane, RGMII/RMII/MII, I2S/TDM, I2C/SPI, Quad-SPI, UART, GPIO, INTC	AEC-Q100
			TC9560BXBG	Ethernet AVB, HSIC I/F, RGMII/RMII/MII, I2S/TDM, I2C/SPI, Quad-SPI, UART, GPIO, INTC	
		PLFBGA120	TC9562XBG	Ethernet AVB, PCIe I/F Gen2.0(5 GT/s), Endpoint, Single lane, RGMII/RMII/MII, I2S/TDM, I2C/SPI, Quad-SPI, UART, GPIO, INTC	
			TC9562AXBG	Ethernet AVB, PCIe I/F Gen2.0(5 GT/s), Endpoint, Single lane, RGMII/RMII/MII/SGMII, I2S/TDM,I2C/SPI, Quad-SPI, UART, GPIO, INTC	
			TC9562BXBG	Ethernet TSN, PCIe I/F Gen2.0(5 GT/s), Endpoint, Single lane, RGMII/RMII/MII/SGMII, I2S/TDM, I2C/SPI, Quad-SPI, UART, GPIO, INTC	
Peripheral Bridge IC	H2C	P-LFBGA64	TC9590XBG	HDMI 1.4a → MIPI CSI2 4 lanex1ch	**
	CPLB	P-VFBGA80	TC9591XBG	MIPI CSI2 4 lanex1ch, Parallel input 24 bit@166 MHz → Parallel output@100 MHz, MIPI CSI2 4 lanex1ch	AEC-Q100
	D2L-LP	P-VFBGA49	TC9592XBG	MIPI DSI2 4 lanex1ch → LVDS Single Link, UXGA 1600x1200 24bit	**
		P-VFBGA64	TC9593XBG	MIPI DSI2 4 lanex1ch → LVDS Dual Link, WUXGA 1920x1200 24bit	AEC-Q100
	CPLB	P-VFBGA80	TC9594XBG	Parallel input 24bit@166 MHz → MIPI DSI 4 lanex1ch, WUXGA 1920x1200 24bit	AEC-Q100
	D2DP	P-VFBGA80	TC9595XBG	MIPI DSI2 4 lanex1ch, Parallel input 24bit@154 MHz → Display port 1.1a, WUXGA 1920x1200 24bit	*
Video Signal Processing IC	2 pictures processing	P-LBGA256	TC90197XBG	2 pictures processing Quick view for rear camera picture Up/down scaling function Built-in frame memory / Split screen display Picture quality improvement function	-
	Single picture processing	P-FBGA228	TC90193SBG	Single picture processing Quick view for rear camera picture Horizontal aberration correction Picture quality improvement function	-
	Single picture processing	P-FBGA228	TC90193ASBG	Single picture processing Quick view for rear camera picture Horizontal aberration correction Picture quality improvement function	-
Video Decoder IC	Video Decoder	LQFP80	TC90105FG	2 ch Video decoder / Built-in 2ch ADC 2ch Picture quality improvement function Built-in 2.5V Regulator	-
	Video Decoder	LQFP64	TC90107FG	Video decoder Picture quality improvement function Built-in 2.5V Regulator	-
	Video Decoder	LQFP64	TC90106FG	Video decoder with Component input interface (up to 525p/625p) Built-in 3ch ADC	-

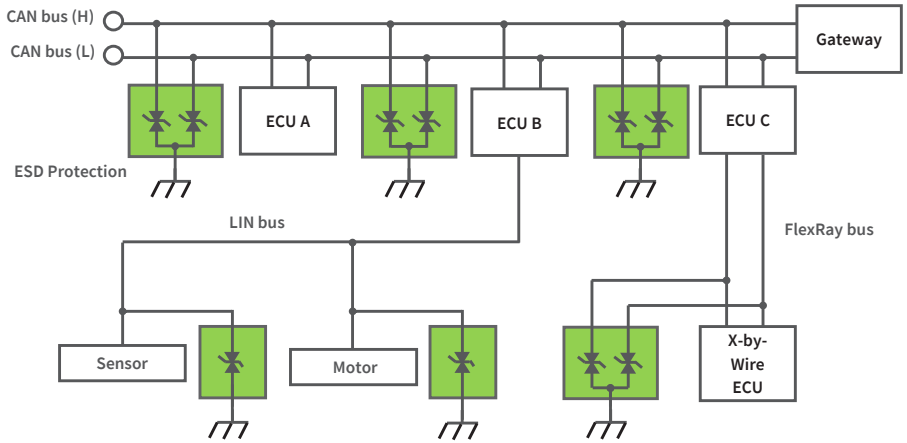
* Under development (The specification is subject to change without notice.), ** Under Consideration

Application **5. Other**

5-4. Bus line protection

System Block

● Automotive Network / Bus line (CAN bus/LIN bus/FlexRay bus)



Recommended Devices

Block	Type	Package	Part Number	Features	AEC-Qxxx qualified
CAN/LIN LINE ESD protection	TVS Diode (ESD Protection Diode)	USC (Single)	DF2B18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF2B29FU	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF2B36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		USM (Dual)	DF3D18FU	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	AEC-Q101
			DF3D29FU	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
			DF3D36FU	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	AEC-Q101
		S-Mini (Dual)	DF3D18F*	V_{RMW}=12 V, C_t=9 pF, V_{ESD}=±30 kV, Bidirectional	**
			DF3D29F*	V_{RMW}=24 V, C_t=9 pF, V_{ESD}=±25 kV, Bidirectional	**
			DF3D36F*	V_{RMW}=28 V, C_t=6.5 pF, V_{ESD}=±25 kV, Bidirectional	**

* Under development (The specification is subject to change without notice.), ** Under Consideration

Switching Diodes

Package	Part Number	Pin Assignment	Absolute Maximum Ratings				Electrical Characteristics max				AEC-Qxxx qualified
			V_R (V)	I_{FSM} (A)	I_O (A)	T_j (°C)	V_F (V) @I_F=0.1 (A)	I_R (μA)	@V_R (V)	t_{rr} (ns)	
ESC (SOD-523) 	1SS387		80	1	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS307E		80	1	0.1	150	1.3	0.01	80	-	AEC-Q101
USC (SOD-323) 	1SS352		80	1	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS403		200	2	0.1	125	1.2	0.1	50	60	AEC-Q101
VESM (SOT-723) 	1SS361FV		80	2	0.1	150	1.2	0.1	30	4	AEC-Q101
	1SS362FV		80	1	0.1	150	1.2	0.1	30	4	AEC-Q101
SSM (SOT-416) 	1SS360		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS361		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
USM (SOT-323) 	1SS300		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS301		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS302A		80	2	0.1	150	1.2	0.1	30	4	AEC-Q101
S-Mini (SOT-346) 	1SS226		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS379		80	2	0.1	125	1.3	0.01	80	-	AEC-Q101
	1SS181		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS184		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	1SS193		80	2	0.1	150	1.2	0.1	30	4	AEC-Q101
	1SS196		80	2	0.1	150	1.2	0.1	30	4	AEC-Q101
	1SS190		80	2	0.1	150	1.2	0.1	30	4	AEC-Q101
	1SS187		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
US6 (SOT-363) 	HN1D01FU		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	HN1D02FU		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	HN1D03FU		80	2	0.1	125	1.2	0.1	30	4	AEC-Q101
	HN2D01FU		80	2	0.08	125	1.2	0.1	30	4	AEC-Q101
	HN2D02FU		80	2	0.08	125	1.2	0.1	30	4	AEC-Q101

Product Lineups
Diodes

Rectifier Diodes

Type	Package	Part Number	Absolute Maximum Ratings				Electrical Characteristics max				AEC-Qxxx qualified
			V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_J (°C)	I_{RRM} (μA)	V_{FM} (V)	@ I_{FM} (A)	t_{rr} (ns)	
General Purpose Rectifier Diode	S-FLAT 	CRG07	400	0.7	15	175	10	1.1	0.7	-	AEC-Q101
		CRG09A	400	1	15	150	5	1.1	0.7	-	AEC-Q101
		CRG10A	600	0.7	15	150	5	1.1	0.7	-	AEC-Q101
		CRG04A	600	1	20	150	5	1.1	1	-	AEC-Q101
	M-FLAT 	CMG06A	600	1	20	150	5	1.1	1	-	AEC-Q101
Supper -Fast Recovery Diode	S-FLAT 	CRF03A	600	0.7	10	150	50	2	0.7	100	AEC-Q101
	M-FLAT 	CMF02A	600	1	10	150	50	2	1	100	AEC-Q101
High-Efficiency Diode	S-FLAT 	CRH02	200	0.5	10	150	10	0.95	0.5	35	AEC-Q101
		CRH01	200	1	15	-40 to 150	10	0.98	1	35	AEC-Q101
	M-FLAT 	CMH04	200	1	20	-40 to 150	10	0.98	1	35	AEC-Q101
		CMH07	200	2	40	-40 to 150	10	0.98	2	35	AEC-Q101
		CMH01	200	3	40	-40 to 150	10	0.98	3	35	AEC-Q101

Zener Diode

Type	Power Dissipation	Package	Part Number	Zener Voltage Vz (V)	AEC-Qxxx qualified
Zener Diode	0.7W	S-FLAT 	CRYxx	6.2,6.8,8.2	AEC-Q101
			CRZxx	10,12,13,15,16,18,20,24,27,30,33,36,39	AEC-Q101

TVS Diodes (ESD Protection Diodes)

Package	Part Number	Pin Assignment	Absolute Maximum Ratings			Electrical Characteristics					AEC-Qxxx qualified
			T_j (°C)	V_{ESD} (kV) IEC61000-4-2	V_{ESD} (kV) ISO10605 @330 pF/2 kΩ	V_Z min (V)	I_R max (μA)	@V_R (V)	Z_Z max (Ω)	C_t typ. (pF)	
VESM (SOT-723) 	DF3A5.6FV		150	-	-	5.3	1	2.5	40	65	AEC-Q101
	DF3A6.2FV		150	-	-	5.8	1	3	30	55	AEC-Q101
	DF3A6.8FV		150	-	-	6.4	0.5	5	25	45	AEC-Q101
	DF3A5.6LFV		150	-	-	5.3	1	3.5	3 (typ.)	8	AEC-Q101
	DF3A6.2LFV		150	-	-	5.9	2.5	5	50	6.5	AEC-Q101
	DF3A6.8LFV		150	-	-	6.5	0.5	5	50	6	AEC-Q101

Package	Part Number	Pin Assignment	Absolute Maximum Ratings			Electrical Characteristics					AEC-Qxxx qualified
			T_j (°C)	V_{ESD} (kV) IEC61000-4-2	V_{ESD} (kV) ISO10605 @330 pF/2 kΩ	V_{RWM} max (V)	I_R max (μA)	@V_{RWM} (V)	R_{DYN} typ. (Ω)	C_t typ. (pF)	
ESC (SOD-523) 	DF2B6.8E		150	±8	-	5	0.5	5	-	15	AEC-Q101
USC (SOD-323) 	DF2B18FU		150	±30	±30	12	0.1	12	0.8	9	AEC-Q101
	DF2B29FU		150	±25	±30	24	0.1	24	1.1	9	AEC-Q101
	DF2B36FU		150	±20	±20	28	0.1	28	1.5	6.5	AEC-Q101
USM (SOT-323) 	DF3D18FU		150	±30	±30	12	0.1	12	0.8	9	AEC-Q101
	DF3D29FU		150	±25	±30	24	0.1	24	1.1	9	AEC-Q101
	DF3D36FU		150	±20	±20	28	0.1	28	1.5	6.5	AEC-Q101
S-Mini (SOT-346) 	DF3D18F*		150	±30	±30	12	0.1	12	0.8	9	**
	DF3D29F*		150	±25	±30	24	0.1	24	1.1	9	**
	DF3D36F*		150	±20	±20	28	0.1	28	1.5	6.5	**
SOD-923 	DF2S5M4FS		150	±20	-	3.6	0.1	3.6	0.35	0.45	AEC-Q101
	DF2S6M4FS		150	±20	-	5.5	0.1	5.5	0.35	0.45	AEC-Q101
	DF2B20M4FS*		150	±15	-	18.5	0.1	18.5	TBD	0.25	**

* Under development (The specification is subject to change without notice.), ** Under Consideration

Product Lineups
Diodes

Schottky Barrier Diodes (1)

Package	Part Number	Pin Assignment	Absolute Maximum Ratings				Electrical Characteristics max				AEC-Qxxx qualified
			V_{RM} (V)	V_R (V)	I_O (A)	T_j (°C)	V_F (V)	@I_F (A)	I_R (μA)	@V_R (V)	
ESC (SOD-523) 	CES388		45	40	0.1	125	0.6	0.1	5	40	AEC-Q101
	1SS389		15	10	0.1	125	0.5	0.1	20	10	AEC-Q101
	1SS405		25	20	0.05	125	0.55	0.05	0.5	20	AEC-Q101
	CES520		-	30	0.2	125	0.6	0.2	5	30	AEC-Q101
USC (SOD-323) 	1SS367		15	10	0.1	125	0.5	0.1	20	10	AEC-Q101
	1SS406		25	20	0.05	125	0.55	0.05	0.5	20	AEC-Q101
	CUS520		-	30	0.2	125	0.6	0.2	5	30	AEC-Q101
	CUS521		-	30	0.2	125	0.5	0.2	30	30	AEC-Q101
	CUS357		45	40	0.1	125	0.6	0.1	5	40	AEC-Q101
S-Mini (SOT-346) 	1SS321		12	10	0.05	125	1	0.05	0.5	10	AEC-Q101
	1SS396		45	40	0.1	125	0.6	0.1	5	40	AEC-Q101

Schottky Barrier Diodes (2)

Package	Part Number	Absolute Maximum Ratings					Electrical Characteristics max				AEC-Qxxx qualified
		V_{RRM} (V)	$I_{F(AV)}$ (A)	I_{FSM} (A)	T_j (°C)	T_{stg} (°C)	I_{RRM} (μA)	@V_{RRM} (V)	V_{FM} (V)	@I_{FM} (A)	
S-FLAT 	CRS03	30	1	20	-40 to 150	-40 to 150	100	30	0.45	0.7	AEC-Q101
	CRS04	40	1	20	-55 to 150	-55 to 150	100	40	0.49	0.7	AEC-Q101
	CRS05	30	1	20	-40 to 150	-40 to 150	200	30	0.45	1	AEC-Q101
	CRS09	30	1.5	30	-40 to 150	-40 to 150	50	30	0.46	1.5	AEC-Q101
	CRS12	60	1	20	-40 to 150	-40 to 150	100	60	0.58	1	AEC-Q101
	CRS13	60	1	20	150	-40 to 150	50	60	0.55	1	AEC-Q101
	CRS14	30	2	30	-40 to 150	-40 to 150	50	30	0.49	2	AEC-Q101
	CRS15	30	3	30	-40 to 150	-40 to 150	50	30	0.52	3	AEC-Q101
	CRS10I30A	30	1	20	150	-55 to 150	60	30	0.39	0.7	AEC-Q101
	CRS10I30B	30	1	20	150	-55 to 150	60	30	0.42	1	AEC-Q101
	CRS10I30C	30	1	30	150	-55 to 150	100	30	0.36	1	AEC-Q101
	CRS15I30A	30	1.5	20	150	-55 to 150	60	30	0.46	1.5	AEC-Q101
	CRS15I30B	30	1.5	30	150	-55 to 150	100	30	0.4	1.5	AEC-Q101
	CRS20I30A	30	2	20	150	-55 to 150	60	30	0.49	2	AEC-Q101
	CRS20I30B	30	2	30	150	-55 to 150	100	30	0.45	2	AEC-Q101
	CRS30I30A	30	3	30	150	-55 to 150	100	30	0.49	3	AEC-Q101
	CRS10I40A	40	1	20	150	-55 to 150	60	40	0.49	0.7	AEC-Q101
	CRS10I40B	40	1	25	150	-55 to 150	100	40	0.45	1	AEC-Q101
	CRS15I40A	40	1.5	20	150	-55 to 150	60	40	0.55	1.5	AEC-Q101
	CRS20I40A	40	2	20	150	-55 to 150	60	40	0.6	2	AEC-Q101
	CRS20I40B	40	2	25	150	-55 to 150	100	40	0.52	2	AEC-Q101
M-FLAT 	CMS03	30	3	40	-40 to 150	-40 to 150	500	30	0.45	3	AEC-Q101
	CMS05	30	5	70	-40 to 150	-40 to 150	800	30	0.45	5	-
	CMS07	30	2	40	-40 to 150	-40 to 150	500	30	0.45	2	AEC-Q101
	CMS09	30	1	25	-40 to 150	-40 to 150	500	30	0.45	1	AEC-Q101
	CMS10	40	1	25	-40 to 150	-40 to 150	500	40	0.55	1	AEC-Q101
	CMS11	40	2	30	-40 to 150	-40 to 150	500	40	0.55	2	AEC-Q101
	CMS14	60	2	40	-40 to 150	-40 to 150	200	60	0.58	2	AEC-Q101
	CMS15	60	3	60	-40 to 150	-40 to 150	300	60	0.58	3	AEC-Q101
	CMS16	40	3	30	-40 to 150	-40 to 150	200	40	0.55	3	AEC-Q101
	CMS17	30	2	30	-40 to 150	-40 to 150	100	30	0.48	2	AEC-Q101
	CMS10I30A	30	1	30	150	-55 to 150	100	30	0.36	1	AEC-Q101
	CMS20I30A	30	2	30	150	-55 to 150	100	30	0.45	2	AEC-Q101
	CMS30I30A	30	3	30	150	-55 to 150	100	30	0.49	3	AEC-Q101
	CMS10I40A	40	1	25	150	-55 to 150	100	40	0.45	1	AEC-Q101
	CMS15I40A	40	1.5	25	150	-55 to 150	100	40	0.49	1.5	AEC-Q101
	CMS20I40A	40	2	25	150	-55 to 150	100	40	0.52	2	AEC-Q101
	CMS30I40A	40	3	25	150	-55 to 150	100	40	0.55	3	AEC-Q101

Product Lineups
Bipolar Transistors/BRTs

■ Bipolar Transistors

Package	POL.	Part Number	Absolute Maximum Ratings				h_{FE}			$V_{CE(sat)}$ (V)		AEC-Qxxx qualified
			V_{CEO} (V)	I_C (A)	P_C (W)	T_j (˚C)	min	max	Test Condition	max	Test Condition	
New PW-Mold 	NPN	2SC3076	50	2	10 (1)	150	70	240	V_{CE}=2 V, I_C=0.5 A	0.5	I_C=1 A, I_B=50 mA	AEC-Q101
		2SC5886A	50	5	20 (1)	150	400	1000	V_{CE}=2 V, I_C=0.5 A	0.22	I_C=1.6 A, I_B=32 mA	AEC-Q101
		TTC016	50	5	24 (1)	175	400	1000	V_{CE}=2 V, I_C=0.5 A	0.22	I_C=1.6 A, I_B=32 mA	AEC-Q101
		2SC6076	80	3	10 (1)	150	180	450	V_{CE}=2 V, I_C=0.5 A	0.5	I_C=1 A, I_B=100 mA	AEC-Q101
		TTC017	80	3	12 (1)	175	180	450	V_{CE}=2 V, I_C=0.5 A	0.5	I_C=1 A, I_B=100 mA	AEC-Q101
		2SC3303	80	5	20 (1)	150	70	240	V_{CE}=1 V, I_C=1 A	0.4	I_C=3 A, I_B=150 mA	AEC-Q101
		TTC008 (4)	285	1.5	1.1	150	100	200	V_{CE}=5 V, I_C=0.3 A	1	I_C=0.5 A, I_B=62.5 mA	AEC-Q101
		2SC6142 (4)	375	1.5	1.1	150	100	200	V_{CE}=5 V, I_C=0.1 A	0.9	I_C=0.8 A, I_B=100 mA	AEC-Q101
		2SC5548A	400	2	15 (1)	150	40	100	V_{CE}=5 V, I_C=0.2 A	1	I_C=0.8 A, I_B=100 mA	AEC-Q101
		2SC6127	800	0.05	10 (1)	150	15	-	V_{CE}=5 V, I_C=0.007 A	1	I_C=0.02 A, I_B=4 mA	AEC-Q101
		TTC014	800	1	40 (1)	150	100	200	V_{CE}=5 V, I_C=0.1 A	1	I_C=0.5 A, I_B=50 mA	AEC-Q101
		2SD1223	80	4	15 (1)	150	2000	-	V_{CE}=2 V, I_C=1 A	1.5	I_C=3 A, I_B=6 mA	AEC-Q101
New PW-Mold2 	PNP	2SA1241	-50	-2	10 (1)	150	70	240	V_{CE}=-2 V, I_C=-0.5 A	-0.5	I_C=-1 A, I_B=-50 mA	AEC-Q101
		2SA1244	-50	-5	20 (1)	150	70	240	V_{CE}=-1 V, I_C=-1 A	-0.4	I_C=-3 A, I_B=-150 mA	AEC-Q101
		2SA2097	-50	-5	20 (1)	150	200	500	V_{CE}=-2 V, I_C=-0.5 A	-0.27	I_C=-1.6 A, I_B=-53 mA	AEC-Q101
		TTA005	-50	-5	24 (1)	175	200	500	V_{CE}=-2 V, I_C=-0.5 A	-0.27	I_C=-1.6 A, I_B=-53 mA	AEC-Q101
		2SB906	-60	-3	20 (1)	150	60	200	V_{CE}=-5 V, I_C=-0.5 A	-1.7	I_C=-3 A, I_B=-300 mA	AEC-Q101
		TTB002	-60	-3	30 (1)	175	100	250	V_{CE}=-5 V, I_C=-0.5 A	-1.7	I_C=-3 A, I_B=-300 mA	AEC-Q101
		TTA003	-80	-3	10 (1)	150	100	200	V_{CE}=-2 V, I_C=-0.5 A	-0.5	I_C=-1 A, I_B=-100 mA	AEC-Q101
		TTA009	-80	-3	12 (1)	175	100	200	V_{CE}=-2 V, I_C=-0.5 A	-0.5	I_C=-1 A, I_B=-100 mA	AEC-Q101
		2SA1225	-160	-1.5	15 (1)	150	70	240	V_{CE}=-5 V, I_C=-0.1 A	-1.5	I_C=-0.5 A, I_B=-50 mA	AEC-Q101
		2SA2034	-400	-2	15 (1)	150	80	240	V_{CE}=-5 V, I_C=-0.1 A	-1	I_C=-0.5 A, I_B=-100 mA	AEC-Q101
		2SA2184	-550	-1	20 (1)	150	80	300	V_{CE}=-5 V, I_C=-0.1 A	-0.7	I_C=-0.3 A, I_B=-60 mA	AEC-Q101
		2SA2142	-600	-0.5	15 (1)	150	100	400	V_{CE}=-5 V, I_C=-0.05 A	-1	I_C=-0.1 A, I_B=-10 mA	AEC-Q101
PW-Mini 	NPN	2SC5819	20	1.5	1.0 (2)	150	400	1000	V_{CE}=2 V, I_C=0.15 A	0.12	I_C=0.5 A, I_B=10 mA	AEC-Q101
		2SC5714	20	4	1.0 (2)	150	400	1000	V_{CE}=2 V, I_C=0.5 A	0.15	I_C=1.6 A, I_B=32 mA	AEC-Q101
		2SC6125	20	4	1.0(2)	150	180	390	V_{CE}=2 V, I_C=0.5 A	0.2	I_C=1.6 A, I_B=53 mA	AEC-Q101
		2SC5810	50	1	1.0 (2)	150	400	1000	V_{CE}=2 V, I_C=0.1 A	0.17	I_C=0.3 A, I_B=6 mA	AEC-Q101
		2SC2873	50	2	1.0 (3)	150	70	240	V_{CE}=2 V, I_C=0.5 A	0.5	I_C=1 A, I_B=50 mA	AEC-Q101
		2SC5712	50	3	1.0 (2)	150	400	1000	V_{CE}=2 V, I_C=0.3 A	0.14	I_C=1 A, I_B=20 mA	AEC-Q101
		2SC6126	50	3	1.0 (2)	150	250	400	V_{CE}=2 V, I_C=0.3 A	0.18	I_C=1 A, I_B=33 mA	AEC-Q101
		2SC6124	80	2	1.0 (2)	150	100	200	V_{CE}=2 V, I_C=0.5 A	0.5	I_C=1 A, I_B=100 mA	AEC-Q101
		2SC2881	120	0.8	1.0 (3)	150	80	240	V_{CE}=5 V, I_C=0.1 A	1	I_C=0.5 A, I_B=50 mA	AEC-Q101
		TTC005	285	1	1.1 (2)	150	100	200	V_{CE}=5 V, I_C=0.1 A	1	I_C=0.6 A, I_B=75 mA	AEC-Q101
		TTC013	350	0.5	1.0 (2)	150	100	200	V_{CE}=5 V, I_C=0.05 A	0.3	I_C=0.16 A, I_B=20 mA	AEC-Q101
		TTC018	500	0.1	1.0 (2)	150	100	300	V_{CE}=10 V, I_C=0.02 A	0.3	I_C=0.02 A, I_B=2 mA	AEC-Q101
		2SD2686	60±10	1	1.0 (2)	150	2000	-	V_{CE}=2 V, I_C=1 A	1.5	I_C=1 A, I_B=1 mA	AEC-Q101
	PNP	2SA2069	-20	-1.5	1.0 (2)	150	200	500	V_{CE}=-2 V, I_C=-0.15 A	-0.14	I_C=-0.5 A, I_B=-17 mA	AEC-Q101
		2SA2059	-20	-3	1.0 (2)	150	200	500	V_{CE}=-2 V, I_C=-0.5 A	-0.19	I_C=-1.6 A, I_B=-53 mA	AEC-Q101
		2SA2070	-50	-1	1.0 (2)	150	200	500	V_{CE}=-2 V, I_C=-0.1 A	-0.2	I_C=-0.3 A, I_B=-10 mA	AEC-Q101
		2SA1213	-50	-2	1.0(3)	150	70	240	V_{CE}=-2 V, I_C=-0.5 A	-0.5	I_C=-1 A, I_B=-50 mA	AEC-Q101
		2SA2060	-50	-2	1.0 (2)	150	200	500	V_{CE}=-2 V, I_C=-0.3 A	-0.2	I_C=-1 A, I_B=-33 mA	AEC-Q101
		2SA2206	-80	-2	1.0 (2)	150	100	200	V_{CE}=-2 V, I_C=-0.5 A	-0.5	I_C=-1 A, I_B=-100 mA	AEC-Q101
		2SA1201	-120	-0.8	1.0 (3)	150	80	240	V_{CE}=-5 V, I_C=-0.1 A	-1	I_C=-0.5 A, I_B=-50 mA	AEC-Q101
		2SA1971	-400	-0.5	1.0 (3)	150	140	400	V_{CE}=-5 V, I_C=-0.1 A	-1	I_C=-0.1 A, I_B=-10 mA	AEC-Q101
		TTA010	-500	-0.1	1.0 (2)	150	100	300	V_{CE}=-10 V, I_C=-0.02 A	-0.3	I_C=-0.02 A, I_B=-2 mA	AEC-Q101

(1) Tc=25˚C
(2) Mounted on an FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm²)
(3) Mounted on a ceramic substrate 250 mm² × 0.8 t
(4) New PW-Mold2

Bipolar Transistors

Package	POL.	Part Number	Absolute Maximum Ratings				h_{FE}			$V_{CE(sat)}$ (V)		AEC-Qxxx qualified
			V_{CEO} (V)	I_C (A)	P_C (W)	T_j (°C)	min	max	Test Condition	max	Test Condition	
VESM 	NPN	2SC6026MFV	50	0.15	0.15 (1)	150	120	400	V_{CE}=6 V, I_C=2 mA	0.25	I_C=0.1 A, I_B=10 mA	AEC-Q101
	PNP	2SA2154MFV	-50	-0.15	0.15 (1)	150	120	400	V_{CE}=-6 V, I_C=-2 mA	-0.3	I_C=-0.1 A, I_B=-10 mA	AEC-Q101
SSM 	NPN	2SC4738	50	0.15	0.1	125	120	700	V_{CE}=6 V, I_C=2 mA	0.25	I_C=0.1 A, I_B=10 mA	AEC-Q101
	PNP	2SA1832	-50	-0.15	0.1	125	70	400	V_{CE}=-6 V, I_C=-2 mA	-0.3	I_C=-0.1 A, I_B=-10 mA	AEC-Q101
USM 	NPN	2SC4116	50	0.15	0.1	125	70	700	V_{CE}=6 V, I_C=2 mA	0.25	I_C=0.1 A, I_B=10 mA	AEC-Q101
		2SC4117	120	0.1	0.1	125	200	700	V_{CE}=6 V, I_C=2 mA	0.3	I_C=0.01 A, I_B=1 mA	AEC-Q101
	PNP	2SA1588	-30	-0.5	0.1	125	70	400	V_{CE}=-1 V, I_C=-100 mA	-0.25	I_C=-0.1 A, I_B=-10 mA	AEC-Q101
		2SA1586	-50	-0.15	0.1	125	70	400	V_{CE}=-6 V, I_C=-2 mA	-0.3	I_C=-0.1 A, I_B=-10 mA	AEC-Q101
		2SA1587	-120	-0.1	0.1	125	200	700	V_{CE}=-6 V, I_C=-2 mA	-0.3	I_C=-0.01 A, I_B=-1 mA	AEC-Q101
US6 	NPN	HN1C03FU	20	0.3	0.2	150	200	1200	V_{CE}=2 V, I_C=4 mA	0.1	I_C=0.03 A, I_B=3 mA	AEC-Q101
		HN1C01FU	50	0.15	0.2	125	120	400	V_{CE}=6 V, I_C=2 mA	0.25	I_C=0.1 A, I_B=10 mA	AEC-Q101
	PNP	HN1A01FU	-50	-0.15	0.2	125	120	400	V_{CE}=-6 V, I_C=-2 mA	-0.3	I_C=-0.1 A, I_B=-10 mA	AEC-Q101
	Comple-mentary	HN1B01FU	-50 50	-0.15 0.15	0.2	125	120	400	V_{CE}=-6 V, I_C=-2 mA V_{CE}=6 V, I_C=2 mA	-0.3 0.25	I_C=-0.1 A, I_B=-10 mA I_C=0.1 A, I_B=10 mA	AEC-Q101
		HN1B04FU	-50 50	-0.15 0.15	0.2	125	120	400	V_{CE}=-6 V, I_C=-2 mA V_{CE}=6 V, I_C=2 mA	-0.3 0.25	I_C=-0.1 A, I_B=-10 mA I_C=0.1 A, I_B=10 mA	AEC-Q101
S-Mini 	NPN	2SC3326	20	0.3	0.15	125	200	1200	V_{CE}=2 V, I_C=4 mA	0.1	I_C=0.03 A, I_B=3 mA	AEC-Q101
		2SC3265	25	0.8	0.2	150	100	320	V_{CE}=1 V, I_C=100 mA	0.4	I_C=0.5 A, I_B=20 mA	AEC-Q101
		2SC2712	50	0.15	0.15	125	70	700	V_{CE}=6 V, I_C=2 mA	0.25	I_C=0.1 A, I_B=10 mA	AEC-Q101
		2SC3325	50	0.5	0.2	150	70	240	V_{CE}=1 V, I_C=100 mA	0.25	I_C=0.1 A, I_B=10 mA	AEC-Q101
		2SC2713	120	0.1	0.15	125	200	700	V_{CE}=6 V, I_C=2 mA	0.3	I_C=0.01 A, I_B=1 mA	AEC-Q101
	PNP	2SA1362	-15	-0.8	0.2	150	120	400	V_{CE}=-1 V, I_C=-100 mA	-0.2	I_C=-0.4 A, I_B=-8 mA	AEC-Q101
		2SA1298	-25	-0.8	0.2	150	100	320	V_{CE}=-1 V, I_C=-100 mA	-0.4	I_C=-0.5 A, I_B=-20 mA	AEC-Q101
		2SA1182	-30	-0.5	0.15	125	70	400	V_{CE}=-1 V, I_C=-100 mA	-0.25	I_C=-0.1 A, I_B=-10 mA	AEC-Q101
		2SA1162	-50	-0.15	0.15	125	70	400	V_{CE}=-6 V, I_C=-2 mA	-0.3	I_C=-0.1 A, I_B=-10 mA	AEC-Q101
		2SA1313	-50	-0.5	0.2	150	70	240	V_{CE}=-1 V, I_C=-100 mA	-0.25	I_C=-0.1 A, I_B=-10 mA	AEC-Q101
		2SA1163	-120	-0.1	0.15	125	200	700	V_{CE}=-6 V, I_C=-2 mA	-0.3	I_C=-0.01 A, I_B=-1mA	AEC-Q101
UFM 	NPN	2SC6100	50	2.5	0.8/0.5 (2)	150	400	1000	V_{CE}=2 V, I_C=300 mA	0.14	I_C=1 A, I_B=20 mA	AEC-Q101
		2SC6135	50	1.0	0.8/0.5 (2)	150	400	1000	V_{CE}=2 V, I_C=100 mA	0.12	I_C=0.3 A, I_B=6 mA	AEC-Q101
	PNP	2SA2215	-20	-2.5	0.8/0.5 (2)	150	200	500	V_{CE}=-2 V, I_C=-500 mA	-0.19	I_C=-1.6 A, I_B=-53 mA	AEC-Q101
		2SA2195	-50	-1.7	0.8/0.5 (2)	150	200	500	V_{CE}=-2 V, I_C=-300 mA	-0.2	I_C=-1.0 A, I_B=-33 mA	AEC-Q101
ES6 	NPN Dual	HN1C01FE	50	0.15	0.1	150	120	400	V_{CE}=6 V, I_C=2 mA	0.25	I_C=0.1 A, I_B=10 mA	AEC-Q101
	PNP Dual	HN1A01FE	-50	-0.15	0.1	150	120	400	V_{CE}=-6 V, I_C=-2 mA	-0.3	I_C=-0.1 A, I_B=-10 mA	AEC-Q101
	Comple-mentary	HN1B04FE	50 -50	0.15 -0.15	0.1	150	120	400	V_{CE}=6 V, I_C=2 mA V_{CE}=-6 V, I_C=-2 mA	0.25 -0.3	I_C=0.1 A, I_B=10 mA I_C=-0.1 A, I_B=-10 mA	AEC-Q101

(1) FR4 board
(2) Ceramic board / FR4 board

Product Lineups
Bipolar Transistors/BRTs

BRTs

|VCEO| (V)	|IC| (mA)	Resistance		VESM (SOT-723)		SSM (SOT-416)		USM (SOT-323)		S-Mini (SOT-346)	
											
											
		R1 typ. (kΩ)	R2 typ. (kΩ)	NPN	PNP	NPN	PNP	NPN	PNP	NPN	PNP
				Part Number							
50	100	4.7	4.7	RN1101MFV #	RN2101MFV #	RN1101 #	RN2101 #	RN1301 #	RN2301 #	RN1401 #	RN2401 #
		10	10	RN1102MFV #	RN2102MFV #	RN1102 #	RN2102 #	RN1302 #	RN2302 #	RN1402 #	RN2402 #
		22	22	RN1103MFV #	RN2103MFV #	RN1103 #	RN2103 #	RN1303 #	RN2303 #	RN1403 #	RN2403 #
		47	47	RN1104MFV #	RN2104MFV #	RN1104 #	RN2104 #	RN1304 #	RN2304 #	RN1404 #	RN2404 #
		2.2	47	RN1105MFV #	RN2105MFV #	RN1105 #	RN2105 #	RN1305 #	RN2305 #	RN1405 #	RN2405 #
		4.7	47	RN1106MFV #	RN2106MFV #	RN1106 #	RN2106 #	RN1306 #	RN2306 #	RN1406 #	RN2406 #
		10	47	RN1107MFV #	RN2107MFV #	RN1107 #	RN2107 #	RN1307 #	RN2307 #	RN1407 #	RN2407 #
		22	47	RN1108MFV #	RN2108MFV #	RN1108 #	RN2108 #	RN1308 #	RN2308 #	RN1408 #	RN2408 #
		47	22	RN1109MFV #	RN2109MFV #	RN1109 #	RN2109 #	RN1309 #	RN2309 #	RN1409 #	RN2409 #
		4.7	∞	RN1110MFV #	RN2110MFV #	RN1110 #	RN2110 #	RN1310 #	RN2310 #	RN1410 #	RN2410 #
		10	∞	RN1111MFV #	RN2111MFV #	RN1111 #	RN2111 #	RN1311 #	RN2311 #	RN1411 #	RN2411 #
		22	∞	RN1112MFV #	RN2112MFV #	RN1112 #	RN2112 #	RN1312 #	-	RN1412 #	RN2412 #
		47	∞	RN1113MFV #	RN2113MFV #	RN1113 #	RN2113 #	RN1313 #	-	RN1413 #	RN2413 #
		1	10	RN1114MFV #	RN2114MFV #	RN1114 #	-	RN1314 #	-	RN1414 #	RN2414 #
		2.2	10	RN1115MFV #	RN2115MFV #	RN1115 #	RN2115 #	RN1315 #	-	RN1415 #	RN2415 #
		4.7	10	RN1116MFV #	RN2116MFV #	RN1116 #	RN2116 #	RN1316 #	-	RN1416 #	RN2416 #
		10	4.7	RN1117MFV #	RN2117MFV #	-	-	-	-	RN1417 #	RN2417 #
		47	10	RN1118MFV #	-	-	-	-	-	RN1418 #	RN2418 #
		1	∞	RN1119MFV#	RN2119MFV #	-	-	-	-	-	-
		100	100	RN1130MFV #	RN2130MFV #	-	-	-	-	-	-
		100	∞	RN1131MFV #	RN2131MFV #	-	-	-	-	-	-
		200	∞	RN1132MFV #	RN2132MFV #	-	-	-	-	-	-

AEC-Q101 qualified

Bipolar Transistors/BRTs

BRTs

|VCEO| (V)	|IC| (mA)	Resistance		ES6 (SOT-563)				US6 (SOT-363)			
											
											
				Point symmetrical		Point symmetrical		Point symmetrical		Point symmetrical	
		R1 typ. (kΩ)	R2 typ. (kΩ)	NPNx2	PNPx2	PNP+NPN	NPN+PNP	NPNx2	PNPx2	PNP+NPN	NPN+PNP
				Part Number							
50	100	4.7	4.7	RN1901FE #	RN2901FE #	RN4901FE #	RN4981FE #	RN1901 #	RN2901 #	RN4901 #	RN4981 #
		10	10	RN1902FE #	RN2902FE #	RN4902FE #	RN4982FE #	RN1902 #	RN2902 #	RN4902 #	RN4982 #
		22	22	RN1903FE #	RN2903FE #	RN4903FE #	RN4983FE #	RN1903 #	RN2903 #	RN4903 #	RN4983 #
		47	47	RN1904FE #	RN2904FE #	RN4904FE #	RN4984FE #	RN1904 #	RN2904 #	RN4904 #	RN4984 #
		2.2	47	RN1905FE #	RN2905FE #	RN4905FE #	RN4985FE #	RN1905 #	RN2905 #	RN4905 #	RN4985 #
		4.7	47	RN1906FE #	RN2906FE #	RN4906FE #	RN4986FE #	RN1906 #	RN2906 #	RN4906 #	RN4986 #
		10	47	RN1907FE #	RN2907FE #	RN4907FE #	RN4987FE #	RN1907 #	RN2907 #	RN4907 #	RN4987 #
		22	47	RN1908FE #	RN2908FE #	RN4908FE #	RN4988FE #	RN1908 #	RN2908 #	RN4908 #	RN4988 #
		47	22	RN1909FE #	RN2909FE #	RN4909FE #	RN4989FE #	RN1909 #	RN2909 #	RN4909 #	RN4989 #
		4.7	∞	RN1910FE #	RN2910FE #	RN4910FE #	RN4990FE #	RN1910 #	RN2910 #	RN4910 #	RN4990 #
		10	∞	RN1911FE #	RN2911FE #	RN4911FE #	RN4991FE #	RN1911 #	RN2911 #	RN4911 #	-

|VCEO| (V)	|IC| (mA)	Resistance		USV (SOT-353)	
					
					
				Emitter Common	
		R1 typ. (kΩ)	R2 typ. (kΩ)	NPNx2	PNPx2
				Part Number	
50	100	4.7	4.7	RN1701 #	RN2701 #
		10	10	RN1702 #	RN2702 #
		22	22	RN1703 #	RN2703 #
		47	47	RN1704 #	RN2704 #
		2.2	47	RN1705 #	RN2705 #
		4.7	47	RN1706 #	RN2706 #
		10	47	RN1707 #	RN2707 #
		22	47	RN1708 #	RN2708 #
		47	22	RN1709 #	RN2709 #
		4.7	∞	RN1710 #	RN2710 #
		10	∞	RN1711 #	RN2711 #
		1	10	-	RN2714 #

AEC-Q101 qualified

Product Lineups
MOSFETs

TO-220SM(W) Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)		C_{iss} typ. (pF)	Q_g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	I_D (A)	P_D (W)	$\|V_{GS}\|$=6 V	$\|V_{GS}\|$=10 V				
N-ch	TK1R4F04PB	40	160	205	1.9	1.35	5500	103	175	AEC-Q101
	TK200F04N1L	40	200	375	1.37	0.9	14920	214	175	AEC-Q101
	TKR74F04PB	40	250	375	0.98	0.74	14200	227	175	AEC-Q101
	TK60F10N1L	100	60	205	9.25	6.11	4320	60	175	AEC-Q101
	TK160F10N1L	100	160	375	3.7	2.4	10100	122	175	AEC-Q101
	XK4R0F10QB	100	(60)	TBD	(7.5)	(4.0)	(4680)	TBD	TBD	**
	XK1R9F10QB	100	160	375	3.31	1.92	11500	184	175	AEC-Q101
P-ch	TJ200F04M3L	-40	-200	375	2.6	1.8	12800	460	175	AEC-Q101

D2PAK+ Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)		C_{iss} typ. (pF)	Q_g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	I_D (A)	P_D (W)	$\|V_{GS}\|$=6 V	$\|V_{GS}\|$=10 V				
N-ch	TK1R5R04PB	40	160	205	2.05	1.5	5500	103	175	AEC-Q101

DPAK+ Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)		C_{iss} typ. (pF)	Q_g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	I_D (A)	P_D (W)	$\|V_{GS}\|$=6 V	$\|V_{GS}\|$=10 V				
N-ch	TK15S04N1L	40	15	46	37 (@4.5 V)	17.8	610	10	175	AEC-Q101
	TK35S04K3L	40	35	58	15	10.3	1370	28	175	AEC-Q101
	TK65S04N1L	40	65	107	7.8 (@4.5 V)	4.3	2550	39	175	AEC-Q101
	TK100S04N1L	40	100	180	4.5 (@4.5 V)	2.3	5490	76	175	AEC-Q101
	TK1R4S04PB	40	120	180	1.9	1.35	5500	103	175	AEC-Q101
	TK8S06K3L	60	8	25	80	54	400	10	175	AEC-Q101
	TK25S06N1L	60	25	57	36.8 (@4.5 V)	18.5	855	15	175	AEC-Q101
	TK40S06N1L	60	40	88.2	18 (@4.5 V)	10.5	1650	26	175	AEC-Q101
	TK60S06K3L	60	60	88	12.3	8	2900	60	175	AEC-Q101
	TK90S06N1L	60	90	157	5.2 (@4.5 V)	3.3	5400	81	175	AEC-Q101
	TK7S10N1Z	100	7	50	-	48	470	7.1	175	AEC-Q101
	TK11S10N1L	100	11	65	50 (@4.5 V)	28	850	15	175	AEC-Q101
	TK33S10N1Z	100	33	125	-	9.7	2050	28	175	AEC-Q101
	TK33S10N1L	100	33	125	16.2 (@4.5 V)	9.7	2250	33	175	AEC-Q101
	TK55S10N1	100	55	157	-	6.5	3280	49	175	AEC-Q101
	TK60S10N1L	100	60	180	9.25	6.11	4320	60	175	AEC-Q101
P-ch	TJ10S04M3L	-40	-10	27	62	44	930	19	175	AEC-Q101
	TJ20S04M3L	-40	-20	41	32	22.2	1850	37	175	AEC-Q101
	TJ40S04M3L	-40	-40	68	13	9.1	4140	83	175	AEC-Q101
	TJ60S04M3L	-40	-60	90	9.4	6.3	6510	125	175	AEC-Q101
	TJ80S04M3L	-40	-80	100	7.9	5.2	7770	158	175	AEC-Q101
	TJ90S04M3L	-40	-90	180	6.0 (@4.5 V)	4.3	7700	172	175	AEC-Q101
	TJ8S06M3L	-60	-8	27	130	104	890	19	175	AEC-Q101
	TJ15S06M3L	-60	-15	41	63	50	1770	36	175	AEC-Q101
	TJ30S06M3L	-60	-30	68	28	21.8	3950	80	175	AEC-Q101
	TJ50S06M3L	-60	-50	90	17.4	13.8	6290	124	175	AEC-Q101
	TJ60S06M3L	-60	-60	100	14.5	11.2	7760	156	175	AEC-Q101
	TJ15S10M3	-100	-15	75	-	130	3200	69	175	-

TOGL Package

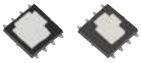
Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)		C_{iss} typ. (pF)	Q_g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	I_D (A)	P_D (W)	$\|V_{GS}\|$=6 V	$\|V_{GS}\|$=10 V				
N-ch	S1PP9*	40	(400)	TBD	TBD	(0.3)	TBD	TBD	TBD	**

* Under development (The specification is subject to change without notice.), **Under Consideration

SOP Advance (WF) Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)		C_{iss} typ. (pF)	Q_g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	I_D (A)	P_D (W)	$\|V_{GS}\|$=6 V	$\|V_{GS}\|$=10 V				
N-ch	XPH3R304PB*	40	(60)	TBD	TBD	(3.3)	(1540)	TBD	TBD	**
	XPH2R404PB*	40	(90)	TBD	TBD	(2.4)	(2800)	TBD	TBD	**
	TPH1R104PB	40	120	132	1.96	1.14	4560	55	175	AEC-Q101
	TPHR7904PB	40	150	170	1.3	0.79	6650	85	175	AEC-Q101
	S1PS0*	60	(70)	TBD	TBD	(3.3)	TBD	TBD	TBD	**
	S1PS1*	60	(110)	TBD	TBD	(2.2)	TBD	TBD	TBD	**
	XPH6R30ANB	100	45	132	9.5	6.3	3240	52	175	AEC-Q101
	XPH4R10ANB	100	70	170	6.2	4.1	4970	75	175	AEC-Q101
P-ch	XPH4R714MC	-40	-60	132	6.9 (@4.5 V)	4.7	5640	160	175	AEC-Q101
	XPH3R114MC	-40	-100	170	4.7 (@4.5 V)	3.1	9500	230	175	AEC-Q101
	S1NL9*	-60	(-60)	TBD	TBD (@4.5 V)	(13)	(6200)	TBD	TBD	**
	S1NL8*	-60	(-90)	TBD	TBD (@4.5 V)	(8.8)	(8655)	TBD	TBD	**

DSOP Advance (WF) Package



Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)		C_{iss} typ. (pF)	Q_g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	I_D (A)	P_D (W)	V_{GS}=6 V	V_{GS}=10 V				
N-ch	TPW1R104PB	40	120	132	1.96	1.14	4560	55	175	AEC-Q101
	TPWR7904PB	40	150	170	1.3	0.79	6650	85	175	AEC-Q101
	XPW6R30ANB*	100	45	132	9.5	6.3	3240	52	175	AEC-Q101
	XPW4R10ANB*	100	(70)	TBD	(6.2)	(4.1)	(4970)	TBD	TBD	**

TSON Advance (WF) Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)		C_{iss} typ. (pF)	Q_g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	I_D (A)	P_D (W)	$\|V_{GS}\|$=6 V	$\|V_{GS}\|$=10 V				
N-ch	XPN7R104NC	40	20	65	14.2 (@4.5 V)	7.1	1290	21	175	AEC-Q101
	XPN3R804NC	40	40	100	7.8 (@4.5 V)	3.8	2230	35	175	AEC-Q101
	XPN12006NC	60	20	65	23.7 (@4.5 V)	12	1100	23	175	AEC-Q101
	XPN6R706NC	60	40	100	13.3 (@4.5 V)	6.7	2000	35	175	AEC-Q101
	XPN2400ANC*	100	(20)	TBD	(30.1 (@4.5 V))	(23.6)	(920)	TBD	TBD	**
	XPN1400ANC*	100	(30)	TBD	(25.2 (@4.5 V))	(13.5)	(1470)	TBD	TBD	**
P-ch	XPN19014MC*	-40	(-20)	TBD	(27.3 (@4.5 V))	(18.7)	(1600)	TBD	TBD	**
	XPN9R614MC	-40	-40	100	13.4 (@4.5 V)	9.6	3000	64	175	AEC-Q101
	S1NM1*	-60	(-15)	TBD	TBD (@4.5 V)	(45.5)	(1950)	TBD	TBD	**
	S1NM0*	-60	(-25)	TBD	TBD (@4.5 V)	(27.3)	(3150)	TBD	TBD	**

PS-8 Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)		C_{iss} typ. (pF)	Q_g typ. (nC)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	I_D (A)	P_D (W)	$\|V_{GS}\|$=6 V	$\|V_{GS}\|$=10 V				
N-ch	TPCP8011	40	5	-	51.2	31.8	505	11.8	175	AEC-Q101
	TPCP8010	40	6	-	38.4	23.8	600	13.1	175	AEC-Q101
	TPCP8009	40	10	-	19.5	11.8	1250	25.1	175	AEC-Q101
	TPCP8013	60	4	-	77.9	51.8	515	12	175	AEC-Q101
	TPCP8012	60	8	-	29.1	20.2	1160	26.6	175	AEC-Q101
P-ch	TPCP8109	-40	-4.5	-	76.8	52.3	810	18	175	AEC-Q101
	TPCP8107	-40	-8	-	26.8	18	2160	44.6	175	AEC-Q101
	TPCP8111	-60	-3	-	158.4	117	760	17	175	AEC-Q101
	TPCP8110	-60	-5	-	53.2	39.5	2075	45	175	AEC-Q101
N-ch x 2	TPCP8207	40	5	-	62.8	36.3	505	11.8	175	AEC-Q101
N-ch + P-ch	TPCP8407	40	5	-	62.8	36.3	505	11.8	175	AEC-Q101
		-40	-4	-	82.2	56.8	810	18	175	

* Under development (The specification is subject to change without notice.), ** Under Consideration

Product Lineups
MOSFETs

SOT-23F Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)				Q_g typ. (nC)	C_{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	V_{GSS} (V)	I_D (A)	$\|V_{GS}\|$=1.5 V	$\|V_{GS}\|$=2.5 V	$\|V_{GS}\|$=4.5 V	$\|V_{GS}\|$=10 V				
N-ch	SSM3K336R	30	±20	3	-	-	140	95	1.7	126	150	AEC-Q101
	SSM3K335R	30	±20	6	-	-	56	38	2.7	340	150	AEC-Q101
	SSM3K333R	30	±20	6	-	-	42	28	3.4	436	150	AEC-Q101
	SSM3K376R	30	12/-8	4	109(@1.8V)	72	56	-	2.2	200	150	AEC-Q101
	SSM3K347R †	38	±20	2	-	-	410	340	2.5	86	150	AEC-Q101
	SSM3K337R †	38	±20	2	-	-	176	150	3	120	150	AEC-Q101
	SSM3K357R	60	±12	0.65	-	2400(@3V)	-	1800(@5 V)	1.5	43	150	AEC-Q101
	SSM3K2615R	60	±20	2	-	580 (@3.3 V)	440 (@4 V)	300	6	150	150	AEC-Q101
	SSM3K318R	60	±20	2.5	-	-	145	107	7	235	150	AEC-Q101
	SSM3K341R	60	±20	6	-	-	51	36	9.3	550	175	AEC-Q101
	SSM3K361R	100	±20	3.5	-	-	92	69	3.2	430	175	AEC-Q101
P-ch	SSM3J377R	-20	-8/+6	-3.9	240	123	93	-	-	290	150	AEC-Q101
	SSM3J371R	-20	-8/+6	-4	150	75	55	-	10.4	630	150	AEC-Q101
	SSM3J378R	-20	-8/+6	-6	88.4	39.7	29.8	-	12.8	840	150	AEC-Q101
	SSM3J374R	-30	-20/+10	-4	-	-	105	71	5.9	280	150	AEC-Q101
	SSM3J372R	-30	-12/+6	-6	144(@1.8V)	72	50	42	8.2	560	150	AEC-Q101
	SSM3J356R	-60	-20/+10	-2	-	-	360	300	8.3	330	150	AEC-Q101
	SSM3J351R	-60	-20/+10	-3.5	-	-	164	134	15.1	660	150	AEC-Q101

TSOP6F Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)				Q_g typ. (nC)	C_{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	V_{GSS} (V)	I_D (A)	$\|V_{GS}\|$=1.5 V	$\|V_{GS}\|$=2.5 V	$\|V_{GS}\|$=4.5 V	$\|V_{GS}\|$=10 V				
N-ch	SSM6K804R*	40	±20	12	-	-	18	12	7.5	1110	175	**
	SSM6K809R	60	±20	6	-	-	51	36	9.3	550	175	AEC-Q101
	SSM6K810R	100	±20	3.5	-	-	92	69	3.2	430	175	AEC-Q101
	SSM6K819R	100	±20	10	-	-	36.4	25.8	3.1	840	175	AEC-Q101
P-ch	SSM6J808R	-40	-20/+10	-7	-	-	48	35	24.2	1020	150	AEC-Q101
	SSM6J811R*	-60	-20/+10	-4			164	134	15.1	660	150	**
N-ch x2	SSM6N357R	60	±12	0.65	-	2400 (@3.0 V)	-	1800(@5 V)	1.5	43	150	AEC-Q101
	SSM6N813R	100	±20	3.5	-	-	154	112	3.6	242	175	AEC-Q101
N-ch+ P-ch	SSM6L820R	30	+12/-8	4	82(@1.8V)	53	39.1	-	2.5	280	150	AEC-Q101
		-20	-12/+6	-4	157(@1.8V)	76	56	45	6.7	480	150	

S-Mini Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)				Q_g typ. (nC)	C_{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	V_{GSS} (V)	I_D (A)	$\|V_{GS}\|$=1.5 V	$\|V_{GS}\|$=2.5 V	$\|V_{GS}\|$=4.5 V	$\|V_{GS}\|$=10 V				
N-ch	SSM3K15F	30	±20	0.1	-	7000	-	-	-	7.8	150	AEC-Q101
	SSM3K7002KF	60	±20	0.4	-	-	1750	1500	0.39	26	150	AEC-Q101
P-ch	SSM3J15F	-30	±20	-0.1	-	32000	-	-	-	9.1	150	AEC-Q101
	SSM3J168F	-60	±20	-0.4	-	-	1900	1550	-	9.1	150	AEC-Q101
	SSM3J375F	-20	-8/+6	-2	311	179	150	-	4.6	270	150	AEC-Q101

UDFN6/UDFN6B Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)				Q_g typ. (nC)	C_{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	V_{GSS} (V)	I_D (A)	$\|V_{GS}\|$=1.5 V	$\|V_{GS}\|$=2.5 V	$\|V_{GS}\|$=4.5 V	$\|V_{GS}\|$=10 V				
N-ch	SSM6K504NU %	30	±20	9	-	-	26	19.5	4.8	620	150	AEC-Q101
N-chx2	SSM6N61NU	20	±8	4	108	45	33	-	3.6	410	150	AEC-Q101
	SSM6N67NU	30	12/-8	4	82(@1.8V)	53	39.1	-	3.2	310	150	AEC-Q101
	SSM6N68NU	30	12/-8	4	180(@1.8V)	117	84	-	1.8	129	150	AEC-Q101
P-chx2	SSM6P69NU	-20	-12/+6	-4	157(@1.8V)	76	56	45	6.74	480	150	AEC-Q101

* Under development (The specification is subject to change without notice.), ** Under Consideration
† With Active clamp
% UDFN6B Package

UF6 Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)				Q_g typ. (nC)	C_{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	V_{GSS} (V)	I_D (A)	$\|V_{GS}\|$=1.5 V	$\|V_{GS}\|$=2.5 V	$\|V_{GS}\|$=4.5 V	$\|V_{GS}\|$=10 V				
N-ch	SSM6K403TU	20	±10	4.2	66	32	28(@4 V)	-	16.8	1050	150	AEC-Q101
	SSM6K404TU	20	±10	3	147	70	55(@4 V)	-	5.9	400	150	AEC-Q101
	SSM6K406TU	30	±20	4.4	-	-	38.5	25	12.4	490	150	AEC-Q101
	SSM6K407TU	60	±20	2	-	-	440 (@4 V)	300	6	150	150	AEC-Q101
P-ch	SSM6J424TU	-20	-8/+6	-6	54	26	22.5	-	23.1	1650	150	AEC-Q101
	SSM6J422TU	-20	-8/+6	-4	99.6	51.4	42.7	-	12.8	840	150	AEC-Q101
	SSM6J402TU	-30	±20	-2	-	-	275 (@4 V)	117	5.3	280	150	AEC-Q101
	SSM6J410TU	-30	±20	-2.1	-	-	393 (@4 V)	216	2.9	120	150	AEC-Q101
	SSM6J401TU	-30	±20	-2.5	-	-	145 (@4 V)	73	16	730	150	AEC-Q101
N-chx2	SSM6N36TU	20	±10	0.5	1520	850	660	-	1.23	46	150	AEC-Q101
	SSM6N62TU	20	±8	0.8	173 456 (@1.2 V)	98	85	-	2	177	150	AEC-Q101
	SSM6N39TU	20	±10	1.6	247	139	119 (@4 V)	-	7.5	260	150	AEC-Q101
	SSM6N24TU	30	±12	0.5	-	180	145	-	-	245	150	AEC-Q101
	SSM6N40TU	30	±20	1.6	-	-	182 (@4 V)	112	5.1	180	150	AEC-Q101
P-chx2	SSM6P36TU	-20	±8	-0.33	3600	1600 (@-2.8V)	1310	-	1.2	43	150	AEC-Q101
	SSM6P39TU	-20	±8	-1.5	-	294	213 (@4 V)	-	6.4	250	150	AEC-Q101
	SSM6P40TU	-30	±20	-1.4	-	-	403 (@4 V)	226	2.9	120	150	AEC-Q101
N-ch+ P-ch	SSM6L36TU	20	±10	0.5	1520	850	660	-	1.23	46	150	AEC-Q101
		-20	±8	-0.33	3600	1600 (@2.8 V)	1310	-	1.2	43	150	
	SSM6L39TU	20	±10	1.6	247	139	119 (@4 V)	-	7.5	260	150	AEC-Q101
		-20	±8	-1.5	-	294	213 (@4 V)	-	6.4	250	150	
	SSM6L12TU	30	±12	0.5	-	180	145	-	-	245	150	AEC-Q101
		-20	±12	-0.4	-	430	260 (@4 V)	-	-	218	150	
	SSM6L40TU	30	±20	1.6	-	-	182 (@4 V)	112	5.1	180	150	AEC-Q101
		-30	±20	-1.4	-	-	403 (@4 V)	226	2.9	120	150	

UFM Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)				Q_g typ. (nC)	C_{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	V_{GSS} (V)	I_D (A)	$\|V_{GS}\|$=1.5 V	$\|V_{GS}\|$=2.5 V	$\|V_{GS}\|$=4.5 V	$\|V_{GS}\|$=10 V				
N-ch	SSM3K36TU	20	±10	0.5	1520	850	660	630(@5 V)	1.23	46	150	AEC-Q101
	SSM3K62TU	20	±8	0.8	139 432 (@1.2 V)	69	57	-	2	177	150	AEC-Q101
	SSM3K122TU	20	±10	2	304	161	-	-	3.4	195	150	AEC-Q101
	SSM3K121TU	20	±10	3.2	140	63	-	-	5.9	400	150	AEC-Q101
	SSM3K123TU	20	±10	4.2	66	32	-	-	13.6	1010	150	AEC-Q101
	SSM3K127TU	30	±12	2	-	167	-	-	1.5	123	150	AEC-Q101
	SSM3K116TU	30	±12	2.2	-	135	100	-	-	245	150	AEC-Q101
	SSM3K131TU	30	±20	6	-	-	41.5	28	10.1	450	150	AEC-Q101
	SSM3H137TU †	34	±20	2	-	-	280	240	3	119	150	AEC-Q101
	SSM3K2615TU	60	±20	2	-	580(@3.3V)	-	300	6	150	150	AEC-Q101
	SSM3K341TU	60	±20	6	-	-	51	36	9.3	550	175	AEC-Q101
	SSM3K361TU	100	±20	3.5	-	-	92	69	3.2	430	175	AEC-Q101
P-ch	SSM3J36TU	-20	±8	-0.33	3600	1600 (@-2.8V)	1310	-	1.2	43	150	AEC-Q101
	SSM3J145TU	-20	-8/+6	-3	260	132	103	-	4.6	270	150	AEC-Q101
	SSM3J144TU	-20	-8/+6	-3.2	240	123	93	-	4.7	290	150	AEC-Q101
	SSM3J140TU	-20	-8/+6	-4.4	63.2	31	25.8	-	24.8	1800	150	AEC-Q101
	SSM3J143TU	-20	-8/+6	-5.5	88.4	39.7	29.8	-	12.8	840	150	AEC-Q101
	SSM3J112TU	-30	±20	-1.1	-	-	790 (@4 V)	390	-	86	150	AEC-Q101
	SSM3J118TU	-30	±20	-1.4	-	-	480 (@4 V)	240	-	137	150	AEC-Q101
	SSM3J117TU	-30	±20	-2	-	-	225 (@4 V)	117	-	280	150	AEC-Q101

USM Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)				Q_g typ. (nC)	C_{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	V_{GSS} (V)	I_D (A)	$\|V_{GS}\|$=1.5 V	$\|V_{GS}\|$=2.5 V	$\|V_{GS}\|$=4.5 V	$\|V_{GS}\|$=10 V				
N-ch	SSM3K16FU	20	±10	0.1	15000	4000	3000 (@4 V)	-	-	9.3	150	AEC-Q101
	SSM3K15FU	30	±20	0.1	-	7000	4000 (@4 V)	-	-	7.8	150	AEC-Q101
	SSM3K17FU	50	±7	0.1	-	40000	20000 (@4 V)	-	-	7	150	AEC-Q101
	SSM3K7002KFU	60	±20	0.4	-	-	1750	1500	0.39	26	150	AEC-Q101
P-ch	SSM3J16FU	-20	±10	-0.1	45000	12000	8000 (@4 V)	-	-	11	150	AEC-Q101
	SSM3J15FU	-30	±20	-0.1	-	32000	12000 (@4 V)	-	-	9.1	150	AEC-Q101

† With Active clamp

Product Lineups
MOSFETs

US6 Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)				Q_g typ. (nC)	C_{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	V_{GSS} (V)	I_D (A)	$\|V_{GS}\|$=1.5 V	$\|V_{GS}\|$=2.5 V	$\|V_{GS}\|$=4.5 V	$\|V_{GS}\|$=10 V				
N-chx2	SSM6N35FU	20	±10	0.18	8000 20000 (@1.2 V)	4000	3000(@4 V)	-	-	9.5	150	AEC-Q101
	SSM6N44FU	30	±20	0.1	-	7000	4000(@4 V)	-	-	8.5	150	AEC-Q101
	SSM6N17FU	50	±7	0.1	-	40000	20000(@4 V)	-	-	7	150	AEC-Q101
	SSM6N7002KFU	60	±20	0.3	-	-	1750	1500	0.39	26	150	AEC-Q101
P-chx2	SSM6P35FU	-20	±10	-0.1	22000 44000 (@1.2 V)	11000	8000(@4 V)	-	-	12.2	150	AEC-Q101
	SSM6P15FU	-30	±20	-0.1	-	32000	12000(@4 V)	-	-	9.1	150	AEC-Q101
N-ch+ P-ch	SSM6L35FU	20	±10	0.18	8000 20000 (@1.2 V)	4000	3000(@4 V)	-	-	9.5	150	AEC-Q101
		-20	±10	-0.1	22000 44000 (@1.2 V)	11000	8000(@4 V)	-	-	12.2	150	

ES6 Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)				Q_g typ. (nC)	C_{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	V_{GSS} (V)	I_D (A)	$\|V_{GS}\|$=1.5 V	$\|V_{GS}\|$=2.5 V	$\|V_{GS}\|$=4.5 V	$\|V_{GS}\|$=10 V				
N-chx2	SSM6N35FE	20	±10	0.18	8000 20000 (@1.2 V)	4000	3000(@4 V)	-	-	9.5	150	AEC-Q101
	SSM6N36FE	20	±10	0.5	1520	850	660	630(@5 V)	1.23	46	150	AEC-Q101
	SSM6N44FE	30	±20	0.1	-	7000	4000(@4 V)	-	-	8.5	150	AEC-Q101
P-chx2	SSM6P35FE	-20	±10	-0.1	22000 44000 (@1.2 V)	11000	8000(@4 V)	-	-	12.2	150	AEC-Q101
	SSM6P36FE	-20	±8	-0.33	3600	1600(@-2.8V)	1310	-	1.2	43	150	AEC-Q101
	SSM6P15FE	-30	±20	-0.1	-	32000	12000(@4 V)	-	-	9.1	150	AEC-Q101
N-ch+ P-ch	SSM6L35FE	20	±10	0.18	8000 20000 (@1.2 V)	4000	3000(@4 V)	-	-	9.5	150	AEC-Q101
		-20	±10	-0.1	22000 44000 (@1.2 V)	11000	8000(@4 V)	-	-	12.2	150	
	SSM6L36FE	20	±10	0.5	1520	850	660	630(@5 V)	1.23	46	150	AEC-Q101
		-20	±8	-0.33	3600	1600 (@2.8 V)	1310	-	1.2	43	150	

SSM Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)				Q_g typ. (nC)	C_{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	V_{GSS} (V)	I_D (A)	$\|V_{GS}\|$=1.5 V	$\|V_{GS}\|$=2.5 V	$\|V_{GS}\|$=4.5 V	$\|V_{GS}\|$=10 V				
N-ch	SSM3K35FS	20	±10	0.18	8000 20000 (@1.2 V)	4000	3000(@4 V)	-	-	9.5	150	AEC-Q101
	SSM3K36FS	20	±10	0.5	1520	850	660	630(@5 V)	1.23	46	150	AEC-Q101
	SSM3K16FS	20	±10	0.2	15000	4000	3000	-	-	9.3	150	AEC-Q101
	SSM3K44FS	30	±20	0.1	-	7000	4000(@4 V)	-	-	8.5	150	AEC-Q101
	SSM3K72KFS	60	±20	0.3	-	-	1750	1500	0.39	26	150	AEC-Q101
P-ch	SSM3J35FS	-20	±10	-0.1	22000 44000 (@1.2 V)	11000	8000(@4 V)	-	-	12.2	150	AEC-Q101
	SSM3J36FS	-20	±8	-0.33	3600	1600(@-2.8V)	1310	-	1.2	43	150	AEC-Q101
	SSM3J15FS	-30	±20	-0.1	-	32000	12000(@4 V)	-	-	9.1	150	AEC-Q101

VESM Package

Polarity	Part Number	Absolute Maximum Ratings			$R_{DS(ON)}$ max (mΩ)				Q_g typ. (nC)	C_{iss} typ. (pF)	Tch (°C)	AEC-Qxxx qualified
		V_{DSS} (V)	V_{GSS} (V)	I_D (A)	$\|V_{GS}\|$=1.5 V	$\|V_{GS}\|$=2.5 V	$\|V_{GS}\|$=4.5 V	$\|V_{GS}\|$=10 V				
N-ch	SSM3K35MFV	20	±10	0.18	8000 20000 (@1.2 V)	4000	3000(@4 V)	-	-	9.5	150	AEC-Q101
	SSM3K36MFV	20	±10	0.5	1520	850	660	630(@5 V)	1.23	46	150	AEC-Q101
	SSM3K44MFV	30	±20	0.1	-	7000	4000(@4 V)	-	-	8.5	150	AEC-Q101
P-ch	SSM3J35MFV	-20	±10	-0.1	22000 44000 (@1.2 V)	11000	8000(@4 V)	-	-	12.2	150	AEC-Q101
	SSM3J66MFV	-20	+6/-8	-0.8	900 4000 (@1.2 V)	480	390	-	1.6	100	150	AEC-Q101
	SSM3J15FV	-30	±20	-0.1	-	32000	12000(@4 V)	-	-	9.1	150	AEC-Q101

One-Gate Logic (L-MOS)

VHS Series

General Specification
Supply voltage range : 2.0 V to 5.5 V
Output current : ± 8 mA (@ V_{CC}=4.5 V)
Propagation delay time : 3.7 nsec typ. (@ V_{CC}=5.0 V)
Quiescent supply current : 2 μA max (@V_{CC}=5.5 V, Ta=25°C)

USV (SOT-353)	SMV (SOT-25)	US8 (SOT-765)
		

Function			Part Number					
			Single-gate					Dual-gate
			USV		SMV		US8	US8
			-	TTL Input	-	TTL Input		
Gates/ Buffers	NAND		TC7SH00FU #	TC7SET00FU #	TC7SH00F #	TC7SET00F #		TC7WH00FK #
	AND		TC7SH08FU #	TC7SET08FU #	TC7SH08F #	TC7SET08F #		TC7WH08FK #
		Open-drain	TC7SH09FU #		TC7SH09F #			
	NOR		TC7SH02FU #	TC7SET02FU #	TC7SH02F #	TC7SET02F #		TC7WH02FK #
	OR		TC7SH32FU #	TC7SET32FU #	TC7SH32F #	TC7SET32F #		TC7WH32FK #
	Exclusive-OR		TC7SH86FU #		TC7SH86F #			
	Inverter		TC7SH04FU #	TC7SET04FU #	TC7SH04F #	TC7SET04F #		TC7WH04FK # (Triple-gate)
		Unbuffered	TC7SHU04FU #		TC7SHU04F #			TC7WHU04FK # (Triple-gate)
		Schmitt	TC7SH14FU #	TC7SET14FU #	TC7SH14F #	TC7SET14F #		TC7WH14FK # (Triple-gate)
	Buffers	Schmitt	TC7SH17FU #	TC7SET17FU #	TC7SH17F #	TC7SET17F #		TC7WH17FK # (Triple-gate)
	Non-Inverter		TC7SH34FU #	TC7SET34FU #	TC7SH34F #	TC7SET34F #		TC7WH34FK # (Triple-gate)
	3-state	Buffers	TC7SH125FU #	TC7SET125FU #	TC7SH125F #	TC7SET125F #		TC7WH125FK #
			TC7SH126FU #	TC7SET126FU #	TC7SH126F #	TC7SET126F #		TC7WH126FK #
D-Type Flip-Flop		Preset and Clear					TC7WH74FK #	
Multiplexers		Digital					TC7WH157FK #	

SHS Series

General Specification
Supply voltage range : 1.65 V to 5.5 V
1.8 V to 5.5 V
Output current : ± 24 mA (@ V_{CC}=3.0 V)
Propagation delay time : 2.4 nsec typ. (@ V_{CC}=3.3 V)
Quiescent supply current : 1 μA max (@V_{CC}=5.5 V, Ta=25°C)

ESV (SOT-553)	USV (SOT-353)	SMV (SOT-25)	US6 (SOT-363)	US8 (SOT-765)
				

Function			Part Number					
			Single-gate				Dual-gate	
	Package		ESV	USV	SMV	US8	US6	US8
Gates/ Buffers	NAND		TC7SZ00FE #	TC7SZ00FU #	TC7SZ00F #			TC7WZ00FK #
	AND		TC7SZ08FE #	TC7SZ08FU #	TC7SZ08F #			TC7WZ08FK #
	NOR		TC7SZ02FE #	TC7SZ02FU #	TC7SZ02F #			TC7WZ02FK #
	OR		TC7SZ32FE #	TC7SZ32FU #	TC7SZ32F #			TC7WZ32FK #
	Exclusive-OR		TC7SZ86FE #	TC7SZ86FU #	TC7SZ86F #			TC7WZ86FK #
	Inverter		TC7SZ04FE #	TC7SZ04FU #	TC7SZ04F #		TC7PZ04FU #	TC7WZ04FK # (Triple-gate)
		Unbuffered	TC7SZU04FE #	TC7SZU04FU #	TC7SZU04F #			TC7WZU04FK # (Triple-gate)
		Open-drain	TC7SZ05FE #	TC7SZ05FU #	TC7SZ05F #		TC7PZ05FU #	TC7WZ05FK # (Triple-gate)
		Schmitt	TC7SZ14FE #	TC7SZ14FU #	TC7SZ14F #		TC7PZ14FU #	TC7WZ14FK # (Triple-gate)
	Buffers	Open-drain	TC7SZ07FE #	TC7SZ07FU #	TC7SZ07F #		TC7PZ07FU #	TC7WZ07FK # (Triple-gate)
		Schmitt	TC7SZ17FE #	TC7SZ17FU #	TC7SZ17F #		TC7PZ17FU #	TC7WZ17FK # (Triple-gate)
	Non-Inverter		TC7SZ34FE #	TC7SZ34FU #	TC7SZ34F #		TC7PZ34FU #	TC7WZ34FK # (Triple-gate)
	3-state	Buffers	TC7SZ125FE #	TC7SZ125FU #	TC7SZ125F #			TC7WZ125FK #
			TC7SZ126FE #	TC7SZ126FU #	TC7SZ126F #			TC7WZ126FK #
D-Type Flip-Flop		Preset and Clear				TC7WZ74FK #		

This device is compliant with the reliability requirements of AEC-Q100

Product Lineups
Standard Logic Devices

■ One-Gate Logic (L-MOS)

7UL Series

General Specification
- 7UL_G series
  Low & Wide Voltage One-Gate-Logic
  Operating voltage range : Vcc = 0.9 to 3.6V
- 7UL_T series
  Level shift function One-Gate-Logic with single power supply
  Operating voltage range : Vcc = 2.3 to 3.6V
  Level up : VIN=1.65V to VOUT=3.6V @Vcc=3.6V

under consideration to compliant with the AEC-Q100(Grade1) reliability requirements

USV (SOT-353)	US8 (SOT-765)
	

Function		7UL_G series		7UL_T series	
		Single-gate	Dual-gate	Single-gate	Dual-gate
	Package	USV	US8	USV	US8
Gates/ Buffers	NOR	7UL1G02FU		7UL1T02FU	
	Inverter	7UL1G04FU			
	Buffer (Open Drain)	7UL1G07FU*			
	AND	7UL1G08FU		7UL1T08FU	
	OR	7UL1G32FU		7UL1T32FU	
	Buffer	7UL1G34FU		7UL1T34FU	
	Exclusive-OR	7UL1G86FU			
	3-State Buffer (/G)	7UL1G125FU	7UL2G125FK	7UL1T125FU	7UL2T125FK
	3-State Buffer (G)	7UL1G126FU	7UL2G126FK	7UL1T126FU	7UL2T126FK
	Inverter (unbuffered)	7UL1GU04FU			

* Under development (The specification is subject to change without notice.)

Standard Logic Devices

Standard Logic 74VHC Series, 74LCX Series (TSSOP14B/16B/20B Package products)

TSSOP14B	TSSOP16B	TSSOP20B
		

Features
- Compliant with the reliability requirements of AEC-Q100 Operating temperature : Available -40 to 125°C products (‡ Operation temperature of this device is -40 to 85°C.)
- Compatible standard TSSOP package

Series name				Pin	VHC	VHCT (TTL Input)	VHCV (Schmitt Input)	VHC9 (Schmitt Input)	LCX
Characteristics and Features		Supply voltage range			2.0 to 5.5 V	4.5 to 5.5 V	1.8 to 5.5 V	2.0 to 5.5 V 4.5 to 5.5 V (VHCT9)	1.65V to 3.6 V to 5.5 V (05 and 07)
		Output current @V_{CC}=4.5 V			±8 mA		±16 mA	±8 mA	±24 mA
		Power down protection on inputs			Yes				Yes
		Power down protection on outputs			No	Yes			Yes
Function					-	-	-	-	-
Gate	NAND			14	74VHC00FT #	74VHCT00AFT #	-	-	74LCX00FT #
				14	74VHC20FT #	-	-	-	-
			Open-drain	14	74VHC03FT #	-	-	-	-
			Schmitt	14	74VHC132FT #	-	-	-	-
	AND			14	74VHC08FT #	74VHCT08AFT #	-	-	74LCX08FT #
				14	74VHC21FT #	-	-	-	-
	NOR			14	74VHC02FT #	-	-	-	74LCX02FT #
				14	74VHC27FT #	-	-	-	-
	OR			14	74VHC32FT #	74VHCT32AFT #	-	-	74LCX32FT #
	Exclusive-OR			14	74VHC86FT #	-	-	-	74LCX86FT #
	Inerter	6 -bit		14	74VHC04FT #	74VHCT04AFT #	-	-	74LCX04FT #
			Open-drain	14	74VHC05FT #	-	74VHCV05FT #	-	74LCX05FT #
			Schmitt	14	74VHC14FT #	74VHCT14AFT #	74VHCV14FT #	-	74LCX14FT #
		9-bit		20	-	-	-	74VHC9152FT #	-
	Non-inverter	6 -bit		14	-	-	74VHCV17FT #	-	-
			Open-drain	14	-	-	74VHCV07FT #	-	74LCX07FT #
		9-bit		20	-	-	-	74VHC9151FT #	-
Buffer	3-state	Quad	Non-inverted	14	74VHC125FT #	74VHCT125AFT #	-	-	74LCX125FT #
				14	74VHC126FT #	74VHCT126AFT #	-	-	74LCX126FT #
			Universal	14	-	-	-	74VHC9125FT # 74VHCT9125AFT #	-
				14	-	-	-	74VHC9126FT # 74VHCT9126AFT #	-
		Octal	Inverted	20	74VHC240FT #	74VHCT240AFT #	74VHCV240FT #	-	74LCX240FT #‡
				20	74VHC540FT #	74VHCT540AFT #	74VHCV540FT #	-	74LCX540FT #‡
			Non-inverted	20	74VHC244FT #	74VHCT244AFT #	74VHCV244FT #	-	74LCX244FT #‡
				20	74VHC541FT #	74VHCT541AFT #	74VHCV541FT #	-	74LCX541FT #‡
			Universal	20	-	-	-	74VHC9541FT # 74VHCT9541AFT #	-
	Transceiver	Octal		20	74VHC245FT #	74VHCT245AFT #	74VHCV245FT #	-	74LCX245FT #‡
Flip-Flop		Dual		14	74VHC74FT #	-	-	-	74LCX74FT #
		Hex		16	74VHC174FT #	-	-	-	-
		Octal		20	74VHC273FT #	-	-	74VHC9273FT # 74VHCT9273FT #	74LCX273FT #
	3-state	Octal		20	74VHC374FT #	-	74VHCV374FT #	-	74LCX374FT #‡
				20	74VHC574FT #	74VHCT574AFT #	74VHCV574FT #	-	74LCX574FT #‡
Latch	3-state	Octal		20	74VHC373FT #	-	74VHCV373FT #	-	74LCX373FT #‡
				20	74VHC573FT #	74VHCT573AFT #	74VHCV573FT #	-	74LCX573FT #‡
Multivibrator				16	74VHC123AFT #	-	-	-	-
				16	74VHC221AFT #	-	-	-	-
Decoder		Single	3 to 8	16	74VHC138FT #	74VHCT138AFT #	-	-	74LCX138FT #
				16	74VHC238FT #	-	-	-	-
		Dual	2 to 4	16	74VHC139FT #	-	-	-	-
Register	Shift	S-in/P-out		14	74VHC164FT #	-	-	-	-
		S-in/P-out, P-in/S-out		16	-	-	-	74VHC9164FT #	-
		P-in/S-out		16	74VHC165FT #	-	-	-	-
		3-state		16	74VHC595FT #	-	-	74VHC9595FT #	-
Counter	Binary		Async.	16	74VHC161FT #	-	-	-	-
			Sync.	16	74VHC163FT #	-	-	-	-
				14	74VHC393FT #	-	-	-	-
				16	74VHC4020FT #	-	-	-	-
				16	74VHC4040FT #	-	-	-	-
Multi-plexer	Digital	Dual		16	74VHC153FT #	-	-	-	-
		Quad		16	74VHC157FT #	-	-	-	74LCX157FT #
		Quad-2ch		20	-	-	-	-	74LCX257FT #
	Analog	Single-8ch.		16	74VHC4051AFT #	-	-	-	-
		Dual-4ch.		16	74VHC4052AFT #	-	-	-	-
		Triple-2ch.		16	74VHC4053AFT #	-	-	-	-
Other	Analog switch			14	74VHC4066AFT #	-	-	-	-

Note: For new designs required high levels of quality and/or reliability, the following product should be used instead of these products.
TC74VHC__FT / TC74LCX__FT
For details, contact your Toshiba sales representative.
This device is compliant with the reliability requirements of AEC-Q100
‡ Operation temperature of this device is -40 to 85°C.

Product Lineups
Photocouplers/Photorelays

Photocouplers

IC Output

Part Number	Pin Configuration	Output Type	Data Rate (Standard)	I_{FHL} max (mA)	Vcc min to max (V) (Note1)	CM min (Kv/μs)	T_{opr} min to max (°C)	BV_S (Vrms)	Package	AEC-Qxxx qualified
TLX9304		Open-collector	1 Mbps	5	4.5 to 20	+/-15	−40 to 125	3750	5pin SO6	AEC-Q101
TLX9309		Open-collector	1 Mbps	-	to 30	+/-10	−40 to 125	3750	5pin SO6	AEC-Q101
TLX9310		Totem-pole (Buffer)	5 Mbps	1 (I_{FLH})	2.7 to 5.5	+/-25	−40 to 105	3750	5pin SO6	AEC-Q101
TLX9378		Open-collector	10 Mbps	5	4.5 to 5.5	+/-15	−40 to 125	3750	5pin SO6	AEC-Q101
TLX9376		Totem-pole (Inverter)	20 Mbps	4	4.5 to 5.5	+/-15	−40 to 125	3750	5pin SO6	AEC-Q101

Transistor Output

Part Number	Pin Configuration	CTR (I_C/I_F) min to max @Ta=25°C (%)	$V_{CE\ (sat)}$ max (V)	V_{CEO} min (V)	I_C max (A)	T_{opr} min to max (°C)	BV_S (Vrms)	Package	AEC-Qxxx qualified
TLX9000		100 to 900	0.4	40	0.05	−40 to 125	3750	SO4	AEC-Q101
TLX9300		100 to 900	0.4	40	0.05	−40 to 125	3750	4pin SO6	AEC-Q101
TLX9291A		50 to 600	0.4	80	0.05	−40 to 125	3750	SO4	AEC-Q101
TLX9185A		50 to 600	0.4	80	0.05	−40 to 125	3750	4pin SO6	AEC-Q101

Photovoltaic Output

Part Number	Pin Configuration	I_{SC} min @Ta=25°C (μA)	V_{OC} min @Ta=25°C (V)	T_{opr} min to max (°C)	BV_S (Vrms)	Package	AEC-Qxxx qualified
TLX9905		12	7	−40 to 125	3750	4pin SO6	AEC-Q101
TLX9906		12	7	−40 to 125	3750	4pin SO6	AEC-Q101

Photorelays

Part Number	Pin Configuration	V_{OFF} max (V)	I_{ON} max (mA)	C_{OFF} typ. (pF)	R_{ON} max (Ω)	I_{FT} max (mA)	T_{opr} min to max (°C)	BV_S (Vrms)	Package	AEC-Qxxx qualified
TLX9175J		600	15	8	335	3	−55 to 105	3750	4pin SO6	AEC-Q101
TLX9160T*		1500	50	100	250	3	−40 to 125	5000	12pin SO16L	**

Note1: Recommended Operating Condition
* Under development (The specification is subject to change without notice.), ** Under Consideration

■ IPDs (Intelligent Power Devices)

High-side Switches

Part Number	Output Channel	Characteristics					Package	Protection			Diagnosis				AEC-Qxxx qualified
		V_{DS} (V)	$V_{DD\ (opr)}$ (V)	Output Current (A)	$R_{DS(ON)}$ max /ch @25°C (Ω)	T_{opr} (°C)		Over Current @25°C	Over Temp	Over Voltage (V)	Over Current	Over Temp	Open Load	Battery short	
TPD1052F	1	40	5 to 18	< 0.8	0.8	-40 to 125	PS-8	0.8A min	150°Cmin	-	✓	✓	-	-	-
TPD1055FA	1	40	5 to 18	< 3	0.12	-40 to 125	WSON10	3A min	150°Cmin	-	✓	✓	✓	✓	AEC-Q100

Low-Side Switches

Part Number	Output Channel	Characteristics					Package	Protection			Diagnosis			AEC-Qxxx qualified
		V_{DD} (V)	$V_{(CL)DSS}$ (V)	Output Current (A)	$R_{DS(ON)}$ max /ch @25°C (Ω)	T_{opr} (°C)		Over Current @25°C	Over Temp	Over Voltage (V)	Over Current	Over Temp	Open Load	
TPD1044F	1	-	41 to 60	< (1)	0.6	-40 to 125	PS-8	1A min	150°Cmin	41	-	-	-	AEC-Q100
TPD1054F	1	-0.3 to 6.0	40 to 50	< (1)	0.8	-40 to 125	PS-8	1A min	150°Cmin	40	✓	✓	✓	**
TPD1058FA	1	-0.3 to 6.0	40 to 60	< (6)	0.1	-40 to 125	WSON10	6A min	150°Cmin	40	✓	✓	✓	**

Pre-drivers

Part Number	Function	Output Channel	Characteristics			Package	Protection				Diagnosis			AEC-Qxxx qualified
			$V_{DD\ (opr)}$ (V)	Output Current	T_{opr} (°C)		Over Current	Over Voltage	Under Voltage	Reverse Battery	Over Current	Over Voltage	Under Voltage	
TPD7211F	Half-Bridge Pw-MOSFET Gate Driver	2	5 to 18	±0.5 A max	-40 to 125	PS-8	-	-	-	-	-	-	-	-
TPD7104AF	High Side Nch Pw-MOSFET Gate Driver	1	5 to 18	Depends on internal drive	-40 to 125	PS-8	Adjust-able	-	-	✓	✓	-	-	AEC-Q100
TPD7212F	3 Phase Full Bridge Pw-MOSFET Gate Driver	6	4.5 to 18	Source:1A Sink:1.5A	-40 to 150	WQFN32	-	✓	✓	-	-	✓	✓	AEC-Q100
TPD7107F	High Side Nch Pw-MOSFET Gate Driver	1	5.75 to 26	Source:-100 µA Sink:5 mA or 270 mA	-40 to 125	WSON10A	✓	✓	✓	✓	✓	✓	✓	AEC-Q100
TPD7106F	High Side Nch Pw-MOSFET Gate Driver	1	4.5 to 27	OUT1:+/-10 mA OUT2:0. 4A(Sink)	-40 to 150	SSOP-16	-	-	-	✓	-	-	-	AEC-Q100
TPD7108F*	High side Nch Pw-MOSFET Gate driver	1	5.75 to 26	Source:100 µA Sink:5 mA or 270 mA	-40 to 125	WSON10A	-	-	-	✓	✓	-	-	**
TPD7212FN*	3 Phase Full-bridge Pw-MOSFET Gate driver	6	4.5 to 18	Source:1A Sink:1.5A	-40 to 150	SSOP30	-	✓	✓	-	-	✓	✓	**
TPD7213FN*	Half-bridge Pw-MOSFET Gate driver	2	12 to 54	Source:1A Sink:1A	-40 to 150	SSOP-16	-	-	✓	-	-	-	✓	**

* Under development (The specification is subject to change without notice.), ** Under Consideration

Motor Driver ICs

Brushed Motor Drivers

Part Number	Package	Functions	Characteristics			Remarks	Supply Voltage (V)	AEC-Qxxx qualified
			Output Current max (A)	Input Voltage max (V)	Power Dissipation max (W)			
TB9101FNG	SSOP24 -0.65 	2ch H-Bridge Motor Driver	±1	40 (1s)	1.32	Diagnostic function, standby function, P-ch + N-ch=1.2 Ω typ.	7 to 18	AEC-Q100
TB9102FNG	SSOP24 -0.65 	6ch Half/3ch H-Bridge Motor Driver	±1	40 (1s)	1.32	SPI communications,Diagnostic function, P-ch + N-ch=1.0 Ω typ.	7 to 18	AEC-Q100
TB9051FTG	P-QFN28 -0.65 	1ch H-Bridge Motor Driver	±5	40 (0.5s)	2.6	DC motor driver IC in a small package that is capable of controlling the throttle and other valves of a vehicle engine Open/close control for engine throttle and other valves	4.5 to 28	AEC-Q100
TB9052FNG	HTSSOP48 -0.5 	H-Bridge Motor Pre-Driver	±1	40 (1s)	3.8	H Bridge FET Driver of the external type. Sequence control logic. Motor current detection circuit. Various self-diagnostic function.	6 to 18	AEC-Q100
TB9056FNG	SSOP24 -0.65 	LIN 1.3 Slave (Classic Check sum) H-Bridge Motor Driver	±0.3	40 (1s)	1.32	LIN 1.3 Slave IC (Classic Check sum) RDSON (H bridge:P-ch + N-ch) = 2.2 Ω typ. Potentiometer support	7 to 18	-
TB9057FG	LQFP48 -0.5 	H-Bridge Motor Pre-Driver	±1	40 (1s)	2	H Bridge FET Driver of the external type. Sequence control logic. Motor current detection circuit. Various self-diagnostic function.	5 to 21	AEC-Q100
TB9058FNG	SSOP24 -0.65 	LIN 1.3 Slave (Enhanced Check sum) H-Bridge Motor Driver	±0.3	40 (1s)	1.32	LIN 1.3 Slave IC (Enhanced Check sum) RDSON (H bridge:P= 2.2 Ω typ.) Potentiometer support	7 to 18	AEC-Q100

Motor Driver ICs

Brushless Motor Drivers

Part Number	Package	Functions	Remarks	Supply Voltage (V)	AEC-Qxxx qualified
TB9061AFNG	SSOP24 -0.65 	Sensor-less control with 120 degree commutation, Motor Pre-Driver	3-phase,full-wave sensor-less drive PWM pulse input control/DC level input control (selectable) Comparator for induced voltage detection Thermal shutdown, overcurrent detection, over voltage detection Output PWM Dynamic range expansion	5.5 to 18	AEC-Q100
TB9062FNG	SSOP24 -0.65 	Sensor-less control with 120 degree commutation, Motor Pre-Driver	3-phase,full-wave sensor-less drive PWM pulse input control Comparator for induced voltage detection Thermal shutdown, overcurrent detection, over/under voltage detection Output PWM Dynamic range expansion Automatic PWM duty control at startup, Automatic soft speed changing control	8 to 16	-
TB9067FNG	SSOP24 -0.65 	Motor Pre-Driver of P-ch/N-ch with 120 degree commutation,	Only a few external parts required, Support for both PWM and DC inputs 120-degree commutation, 5-V sensor comparator	6 to 18	-
TB9068FG	LQFP48 -0.5 	Motor Driver with a LIN transceiver	LIN 1.3-based transceiver RDSON = 1.8 Ω typ. 120-degree commutation logic MODE SELECTION for MOTOR CONTROL	7 to 18	-
TB9080FG	LQFP64 -0.5 	Motor Pre-Driver for sine-wave control	Supports both PWM and DC inputs for sine-wave driver logic. Motor RPM feedback, auto lead angle correction Abnormal condition detection such as overcurrent, overvoltage, overtemperature and motor lock Sleep mode	7 to 18	AEC-Q100
TB9081FG	LQFP64 -0.5 	3-Phase Brushless Motor Pre-Driver	New three-phase motor pre-driver IC designed for high-current applications such as electric power assisted steering (EPS) 5ch safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits	4.5 to 28	AEC-Q100
TB9083FTG*	P-VQFN48 -0.5 	3-Phase Brushless Motor Pre-Driver	New 3-phase motor pre-driver IC designed for high-current applications such as electric power assisted steering (EPS) 3ch safety relays, Selectable operation on fault detection Initial diagnosis of detection circuits, Tj=175degrees	4.5 to 28	AEC-Q100

Stepping Motor Driver

Part Number	Package	Functions	Remarks	Supply Voltage (V)	AEC-Qxxx qualified
TB9120AFTG	P-VQFN28 -0.65 	2-Phase Bipolar Stepping Motor Driver with a clock input interface	Constant-current PWM control, Micro step drive, Supporting up to 1/32 steps, Stall detection, Mixed decay mode, Wettable pins with excellent solderability	7 to 18	AEC-Q100

* Under development (The specification is subject to change without notice.)

Product Lineups
ICs

System Power Supply ICs

Part Number	Package	Functions	Characteristics			Remarks	Supply Voltage (V)	AEC-Qxxx qualified
			Output Voltage typ. (V)	Input Voltage max (V)	Power Dissipation max (W)			
TB9005FNG	SSOP20 -0.65 	CPU voltage regulator, watchdog timer	5	45(1s)	0.68	Low current consumption:90 μA typ. Watchdog timer enable/disable Reset detection:4.7 V or 4.2 V (selectable) External transistor required	6 to 18	AEC-Q100
TB9044AFNG	HTSSOP48 -0.5 	Multiple-output regulator for CPU Watchdog timer SPI I/F	5(Reg) 5(Tracker) 5(Tracker) 5(Tracker)	40(1s)	3.84	Buck/Boost Switching regulator and series regulator and tracker Over and under voltage detection, current limiter,over temperature detection.	2.7 to 28	AEC-Q100
TB9045FNG series	HTSSOP48 -0.5 	Multiple-output regulator for CPU Watchdog timer SPI I/F	5(Reg) 5(Tracker) 5(Tracker) 5(Tracker)1.5 /1.25/1.2/1.1 (Reg)	40(1s)	3.84	Buck/Boost Switching regulator and series regulator and tracker Over and under voltage detection, current limiter,over temperature detection. 1.5 V/1.25 V/1.2 V/1.1 V selectable output for CPU core.	2.7 to 28	AEC-Q100

Buffering ICs for Inverter

Part Number	Package	Functions	Remarks	Supply Voltage (V)	AEC-Qxxx qualified
TC74VHC9363FT TC74VHC9364FT	TSSOP20B 	Dual 3 bit buffer for control signal of High-side and Low-side circuits.	For use between MCU and Pri driver IC When either /GHn or /GLn are high, the terminal outputs are in the low level(TC74VHC9363) and high level(TC74VHC9364). All inputs have pull-up, pull-down resistance and schmitt trigger function. All inputs are 5.5 V Tolerant	2.0 to 5.5	AEC-Q100

Signal Level Translation & Buffering ICs

US8  US16  TSSOP16B 

Part Number	Package	Bit Width	Functions	V_{CCA} (V)	V_{CCB} (V)	Remarks	AEC-Qxxx qualified
TC7MP3125FT TC7MP3125FK	TSSOP16B US16	4	Dual-Supply Bus Transceiver. Bi-directional transmission possible by DIR terminal control.	1.1 to 2.7	1.65 to 3.6	Translation voltage range is 1.1 to 3.6 V Ideal for high load drive with buffer type output structure All I/Os are 3.6V Tolerant	AEC-Q100
TC7MPN3125FT TC7MPN3125FK	TSSOP16B US16	4				Low Noise (10 dB reduction compared with TC7MP3125 Series)	AEC-Q100
TC7WP3125FK*	US8	2	Dual-Supply Bus Buffer. Uni-directional type level up conversion IC.	1.1 to 2.7	1.65 to 3.6	Translation voltage range is 1.1 to 3.6 V Ideal for high load drive with buffer type output structure All I/Os are 3.6V Tolerant	**
TC7WPN3125FK*	US8	2				Low Noise (10 dB reduction compared with TC7MP3125 Series)	**

Part Number	Package	Bit Width	Functions	V_{CCA} (V)	Control Input	Remarks		AEC-Qxxx qualified
74LV4T125FT 74LV4T125FK	TSSOP16B US16	4	Single Power Supply Unidirection Level Shifter IC(Level Up and Down). Quadruple Buffer With 3-State Output.	1.8 to 5.0	Active low	<UP Translation> 1.2V→1.8V@Vcc=1.8V 1.5V→2.5V@Vcc=2.5V 1.8V→3.3V@Vcc=3.3V 3.3V→5.0V@Vcc=5.0V	<Down translation> 3.3V→1.8V@Vcc=1.8V 3.3V→2.5V@Vcc=2.5V 5.0V→3.3V@Vcc=3.3V	AEC-Q100
74LV4T126FT 74LV4T126FK	TSSOP16B US16	4			Active High			AEC-Q100

* Under development (The specification is subject to change without notice.), ** Under Consideration

Image Recognition Processors

Part Number	Package	Series	Maximum Operating Frequency (MHz) (MeP, MPE)	Media Processing Engine [MPE]	Image Processing Accelerator									Video Input Interface (ch)	Video Output Interface (ch)	PCI Express®	UART	SPI	I²C	CAN	PCM	Memory Controller	CPU Core		AEC-Qxxx qualified
					Affine Transformation	Pyramid	Filter	Histogram	Histogram of Oriented Gradients [HOG]	Enhanced CoHOG	Matching	SfM												Toshiba's Proprietary 32-bit RISC CPU Mep	Arm 32-bit RISC Arm® Cortex®-A9 MPCore	
TMPV7608XBG	PFBGA796 	Visconti4	266.7	✓	✓	✓	✓	✓	✓	✓	✓	✓	8	1	-	5	4	8	3	2	LPDDR2-SDRAM, SRAM, ROM, NOR Flash	✓	-	AEC-Q100

Part Number	Package	Series	Maximum Operating Frequency (MHz)	Arm® Cortex®-A53 DSP	Image Processing Accelerator									Video Input Interface (ch)	Video Output Interface (ch)	PCI Express®	Gigabit Ethernet	UART	SPI	I²C	CAN FD	PCM	Memory Controller	CPU Core	AEC-Qxxx qualified
					Affine Transformation	Pyramid	Enhanced CoHOG	Template Matching	Dense Stereo Matching	Deep Neural Network	Image Signal Processor													Arm® Cortex®-R4F DLC	
TMPV7708XBG *	PFBGA1018	Visconti5	CA53:840 CR4:900 DSP:500 DNN:500	○	○	○	○	○	○	○	○	○	6	1	○	○	○	○	○	○	○	○	LPDDR4-SDRAM, Serial NOR Flash	○	AEC-Q100
TMPV7706XBG *	PFBGA621	Visconti5	CA53:840 CR4:900 DSP:500 DNN:500	○	○	○	○	○	○	○	○	○	2	1	-	○	○	○	○	○	○	-	LPDDR4-SDRAM, Serial NOR Flash	○	AEC-Q100

* Under development (The specification is subject to change without notice.)

Product Lineups
ICs

Ethernet Bridge ICs

Part Number	Package	Host (External application) I/F	Automotive I/F			Audio I/F	Peripheral I/F	CPU Core	Supply Voltage (V)	AEC-Qxxx qualified
			Ethernet AVB [IEEE802. 1AS, IEEE802. 1Qav]	Ethernet TSN [IEEE802.1 Qbv, IEEE802.1 Qbu, IEEE802.3 br]	MAC-PHY I/F					
TC9560XBG	PLFBGA170 	PCIe® I/F Gen2.0 (5 GT/s), Endpoint, Single lane	✓	-	RGMII /RMII /MII	I2S/ TDM	I2C/SPI Quad-SPI UART, GPIO, INTC	Arm® Cortex®-M3	1.8/3.3 for IO 1.8/2.5/3.3 for RGMII/RMII/MII 1.8 for PCIe, 1.1 for Core	AEC-Q100
TC9560BXBG	PLFBGA170 	HSIC I/F (480 Mbps)	✓	-	RGMII /RMII /MII	I2S/ TDM	I2C/SPI Quad-SPI UART, GPIO, INTC	Arm® Cortex®-M3	1.8/3.3 for IO 1.2 for HSIC 1.8/2.5/3.3 for RGMII/RMII/MII 1.8 for PCIe, 1.1 for Core	AEC-Q100
TC9562XBG	PLFBGA120 	PCIe® I/F Gen2.0 (5 GT/s), Endpoint, Single lane	✓	-	RGMII /RMII /MII	I2S/ TDM	I2C/SPI Quad-SPI UART, GPIO, INTC	Arm® Cortex®-M3	1.8/3.3 for IO 1.8/2.5/3.3 for RGMII/RMII/MII 1.8 for PCIe, 1.1 for Core	AEC-Q100
TC9562AXBG	PLFBGA120 	PCIe® I/F Gen2.0 (5 GT/s), Endpoint, Single lane	✓	-	RGMII /RMII /MII /SGMII	I2S/ TDM	I2C/SPI Quad-SPI UART, GPIO, INTC	Arm® Cortex®-M3	1.8/3.3 for IO 1.8/2.5/3.3 for RGMII/RMII/MII 1.8 for SGMII 1.8 for PCIe, 1.1 for Core	AEC-Q100
TC9562BXBG	PLFBGA120 	PCIe® I/F Gen2.0 (5 GT/s), Endpoint, Single lane	✓	✓	RGMII /RMII /MII /SGMII	I2S/ TDM	I2C/SPI Quad-SPI UART, GPIO, INTC	Arm® Cortex®-M3	1.8/3.3 for IO 1.8/2.5/3.3 for RGMII/RMII/MII 1.8 for SGMII 1.8 for PCIe, 1.1 for Core	AEC-Q100

Peripheral Bridge ICs

Part Number	Package	Type	Input	Output	Resolution	Operating Temperature (°C)	AEC-Qxxx qualified
TC9590XBG	P-LFBGA64 	H2C	HDMI® 1.4a	MIPI® CSI-2 4 lane x 1ch	-	-40 to 85	**
TC9591XBG	P-VFBGA80 	CPLB	MIPI® CSI-2 4 lane x 1ch Parallel Input 24bit @166 MHz	Parallel Output 24bit@100MHz MIPI® CSI-2 4 lane x 1ch	-	-40 to 105	AEC-Q100
TC9592XBG	P-VFBGA49 	D2L - LP	MIPI® DSI 4 lane x 1ch	LVDS Single Link (5pairs/link)	UXGA 1600 x 1200 24bit	-40 to 85	**
TC9593XBG	P-VFBGA64 	D2L - LP	MIPI® DSI 4 lane x 1ch	LVDS Dual Link (5pairs/link)	WUXGA 1920 x 1200 24bit	-40 to 85	AEC-Q100
TC9594XBG	P-VFBGA80 	CPLB	Parallel Input 24bit @166 MHz	MIPI® DSI 4 lane x 1ch	WUXGA 1920 x 1200 24bit	-40 to 105	AEC-Q100
TC9595XBG	P-VFBGA80 	D2DP	MIPI® DSI 4 lane x 1ch Parallel Input 24bit @154 MHz	DisplayPort™ 1.1a	WUXGA 1920 x 1200 24bit	-40 to 85	*

* Under development (The specification is subject to change without notice.), ** Under Consideration

Video Processor

Part Number	Package	Function	Input Signal Format/ Others	Display System	Operating Temperature (°C)	Supply Voltage (V)	AEC-Qxxx qualified
TC90197XBG	P-LBGA256 	2 pictures processing Quick view for rear camera picture Up/down Scaling function / Split screen display Parking assist (guide line/ OSD) Picture quality improvement	Analog : CVBS-3 / YCbCr-2 or RGB-2/ LVTTL : D-RGB-1 / D-RGB-2 or BT.601, BT.656 Video decoder 2ch (ADC 8bit 4ch)	WVGA	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-
TC90193SBG	P-FBGA228 	Single pictures processing Quick view for rear camera picture Parking assist (guide line/ OSD) Picture quality improvement	Analog : CVBS-1 LVTTL : D-RGB / BT.656 Video decoder 1ch (ADC 8bit 1ch)	QVGA WQVGA WVGA	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-
TC90193ASBG	P-FBGA228 	Single pictures process Quick view for rear camera picture Picture quality improvement Mute less picture output at switch of input signal (CVBS⇔Digital)	Analog : CVBS-1 LVTTL : D-RGB Video decoder 1ch (ADC 8bit 1ch)	QVGA WQVGA WVGA	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-

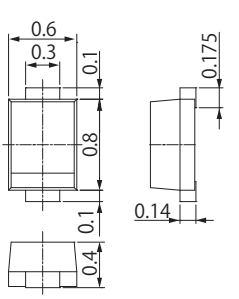
Video Decoder ICs

Part Number	Package	Function	ADC	Color Decoder (S)	New Picture Adjust-ment	ITU-R BT .601 Output	ITU-R BT .656 Output	Operating Tempera-ture (°C)	Supply Voltage (V)	AEC-Qxxx qualified
TC90105FG	LQFP80 	2ch Video decoder with 2.5 V Regulator	2	2	✓	✓	✓	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-
TC90107FG	LQFP64 	Video decoder with 2.5 V Regulator	1	1	✓	-	✓	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-
TC90106FG	LQFP64 	Video decoder with Component Input interface (up to 525p/625p)	3	1	-	-	✓ (Pseudo 656 output for 525p/625p input mode)	-40 to 85	1.4 to 1.6 2.3 to 2.7 3.0 to 3.6	-

Product Lineups
Packages

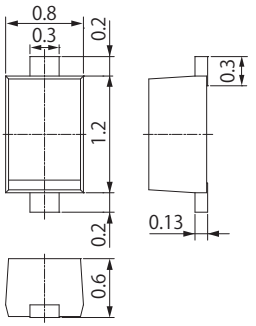
SOD-923

Package dimension unit : mm



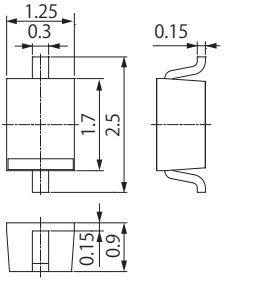
ESC (SOD-523)

Package dimension unit : mm



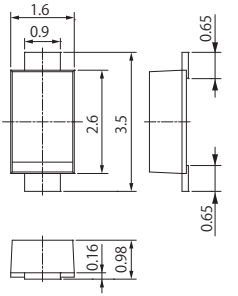
USC (SOD-323)

Package dimension unit : mm



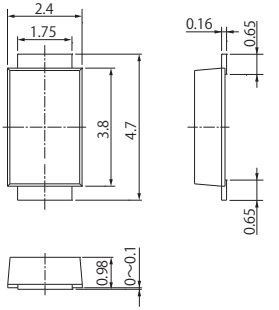
S-FLAT™

Package dimension unit : mm



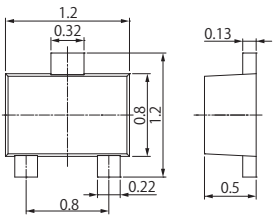
M-FLAT™

Package dimension unit : mm



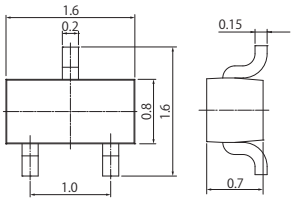
VESM (SOT-723)

Package dimension unit : mm



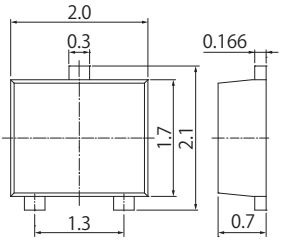
SSM (SOT-416)

Package dimension unit : mm



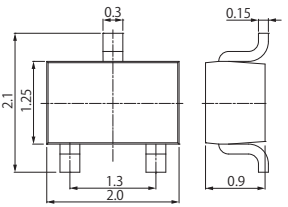
UFM (SOT-323F)

Package dimension unit : mm



USM (SOT-323)

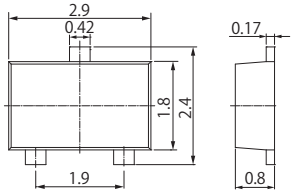
Package dimension unit : mm



Packages

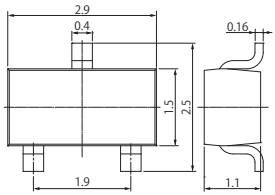
SOT-23F

Package dimension unit : mm



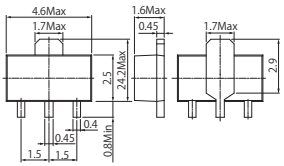
S-Mini (SOT-346)

Package dimension unit : mm



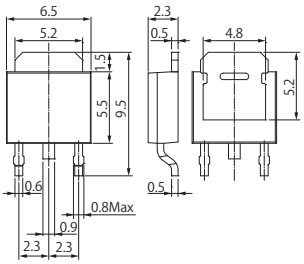
PW-Mini

Package dimension unit : mm



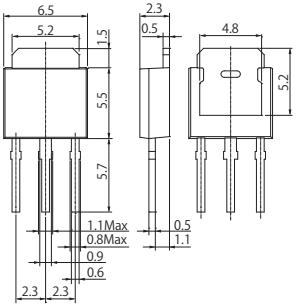
DPAK+/New PW-Mold

Package dimension unit : mm



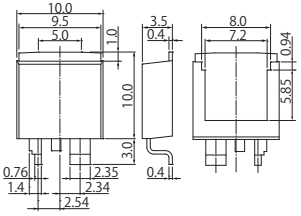
New PW-Mold2

Package dimension unit : mm



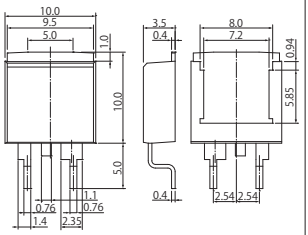
TO-220SM(W)

Package dimension unit : mm



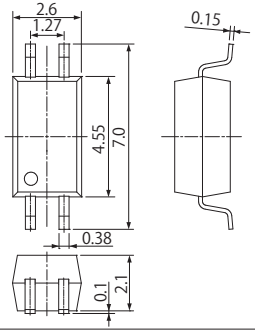
D2PAK+

Package dimension unit : mm



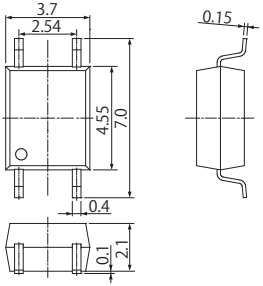
SO4

Package dimension unit : mm



4pin SO6

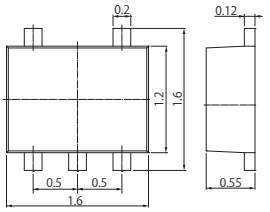
Package dimension unit : mm



Product Lineups
Packages

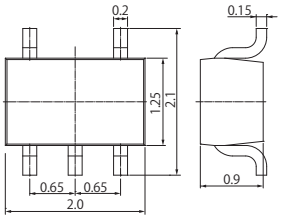
ESV (SOT-553)

Package dimension unit : mm



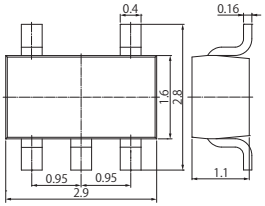
USV (SOT-353)

Package dimension unit : mm



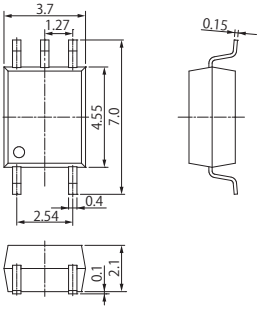
SMV (SOT-25)

Package dimension unit : mm



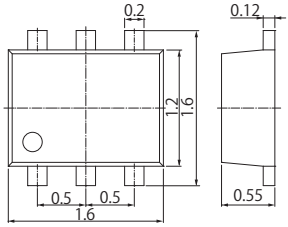
5pin SO6

Package dimension unit : mm



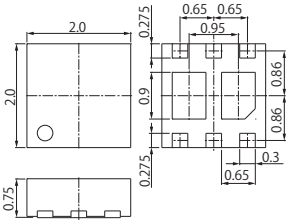
ES6 (SOT-563)

Package dimension unit : mm



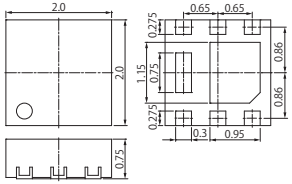
UDFN6 (SOT-1118)

Package dimension unit : mm



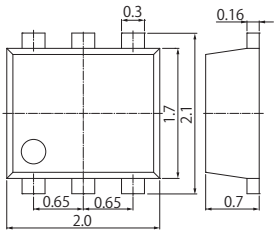
UDFN6B (SOT-1220)

Package dimension unit : mm



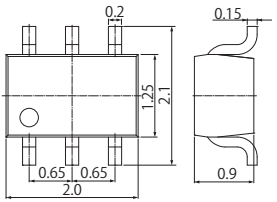
UF6 (SOT-363F)

Package dimension unit : mm



US6 (SOT-363)

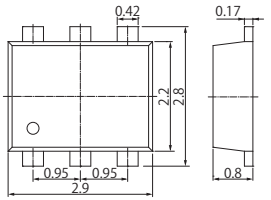
Package dimension unit : mm



Packages

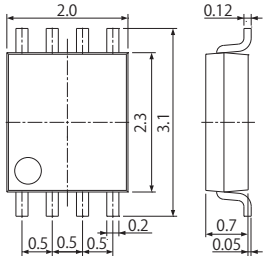
TSOP6F

Package dimension unit : mm



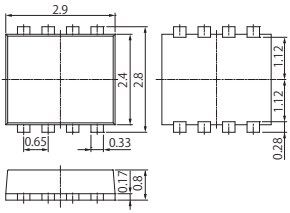
US8 (SOT-765)

Package dimension unit : mm



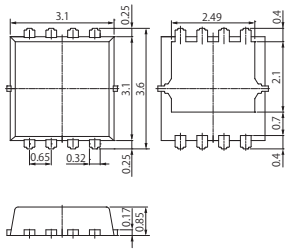
PS-8

Package dimension unit : mm



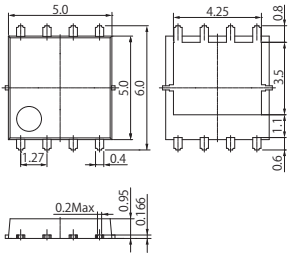
TSON Advance (WF)

Package dimension unit : mm



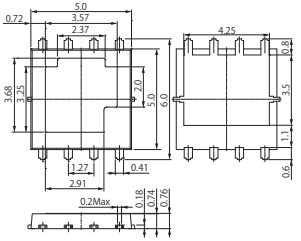
SOP Advance (WF)

Package dimension unit : mm



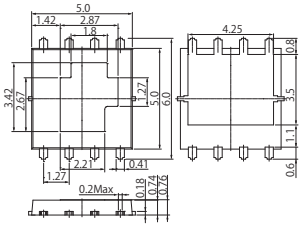
DSOP Advance (WF)L

Package dimension unit : mm



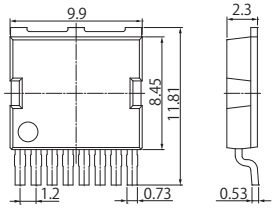
DSOP Advance (WF)M

Package dimension unit : mm



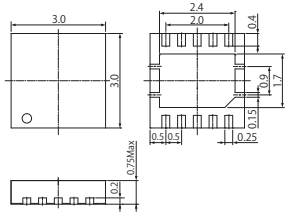
TOGL

Package dimension unit : mm



WSON10

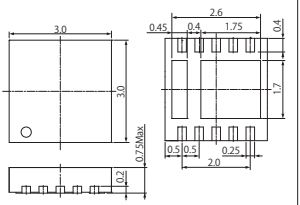
Package dimension unit : mm



Product Lineups
Packages

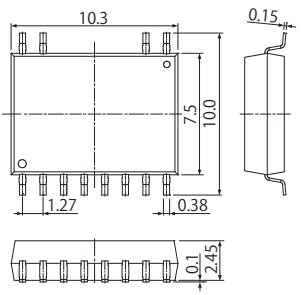
WSON10A

Package dimension unit : mm



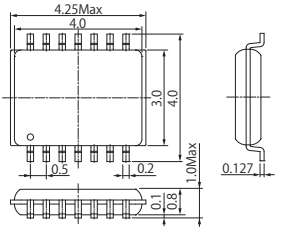
12pin SO16L

Package dimension unit : mm



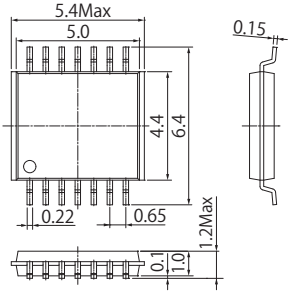
US14

Package dimension unit : mm



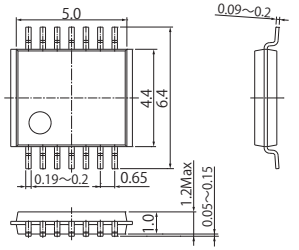
TSSOP14

Package dimension unit : mm



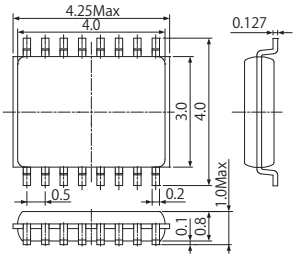
TSSOP14B

Package dimension unit : mm



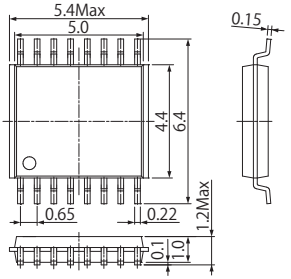
US16

Package dimension unit : mm



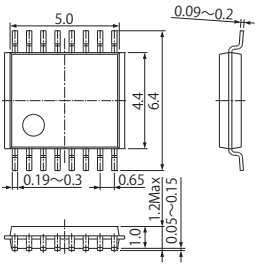
TSSOP16

Package dimension unit : mm



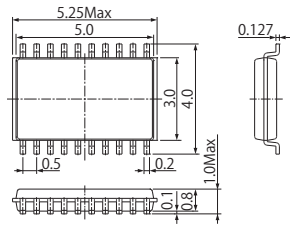
TSSOP16B

Package dimension unit : mm



US20

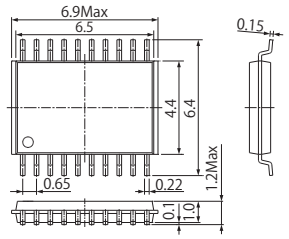
Package dimension unit : mm



Packages

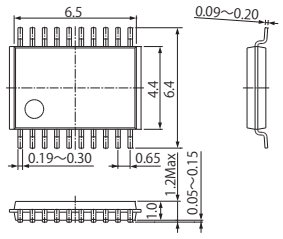
TSSOP20

Package dimension unit : mm



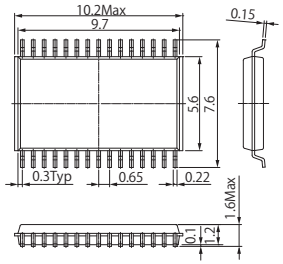
TSSOP20B

Package dimension unit : mm



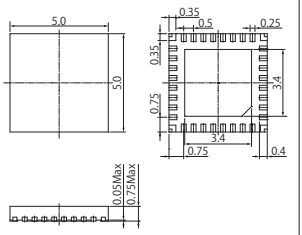
SSOP30

Package dimension unit : mm



WQFN32

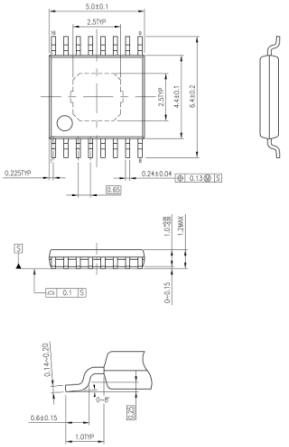
Package dimension unit : mm



Product Lineups
Packages

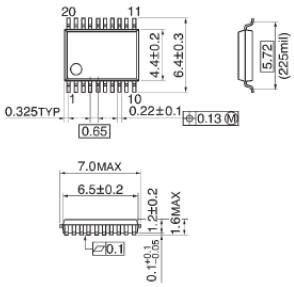
HTSSOP16-0.65

Package dimension unit : mm



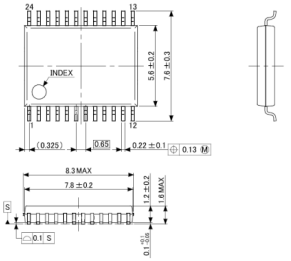
SSOP20-0.65

Package dimension unit : mm



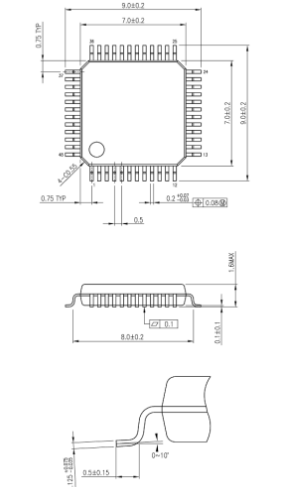
SSOP24-0.65

Package dimension unit : mm



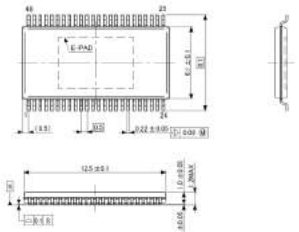
LQFP48-0.5

Package dimension unit : mm



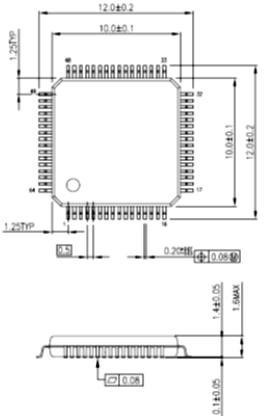
HTSSOP48-0.5

Package dimension unit : mm



LQFP64-0.5

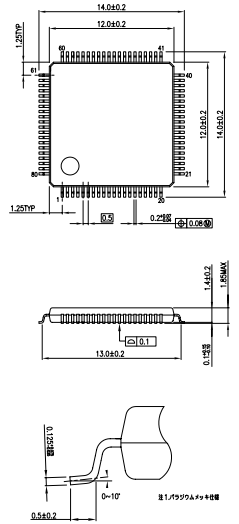
Package dimension unit : mm



Packages

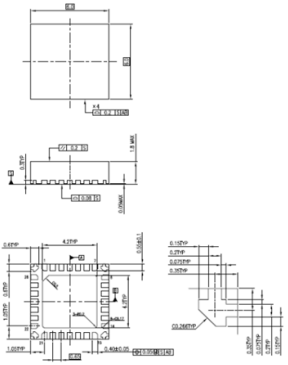
LQFP80

Package dimension unit : mm



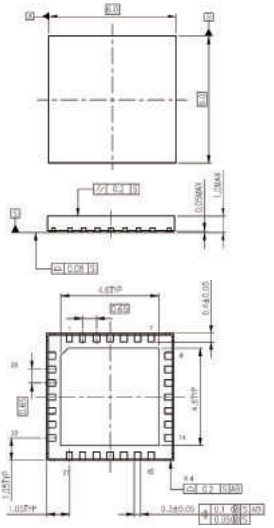
P-QFN28-0.65

Package dimension unit : mm



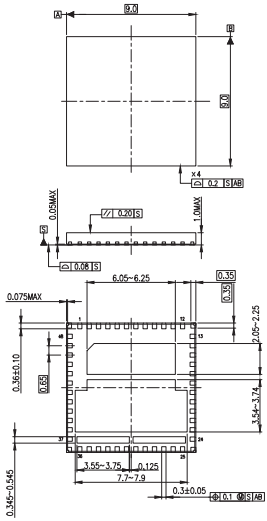
VQFN28-0.65

Package dimension unit : mm



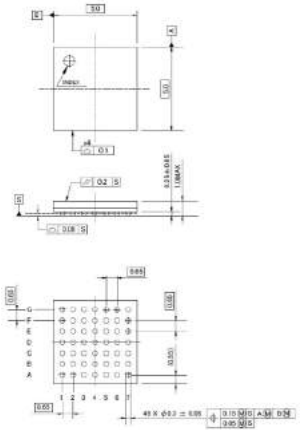
P-VQFN48-0.65

Package dimension unit : mm



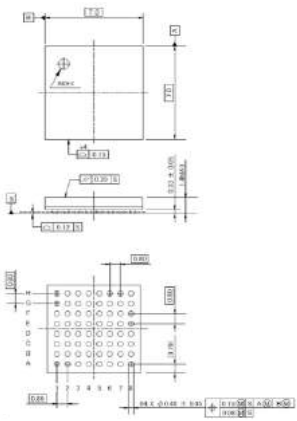
P-VFBGA49

Package dimension unit : mm



P-LFBGA64

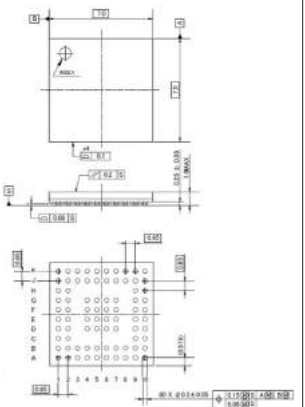
Package dimension unit : mm



Product Lineups
Packages

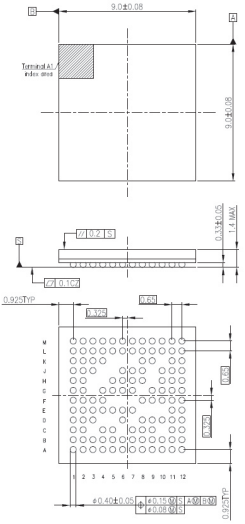
P-VFBGA80

Package dimension unit : mm



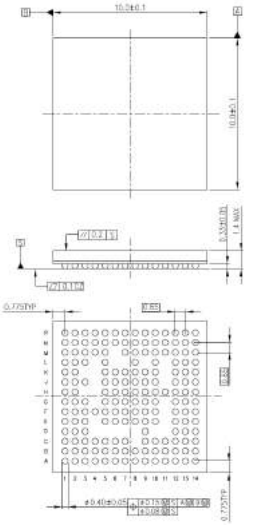
PLFBGA120

Package dimension unit : mm



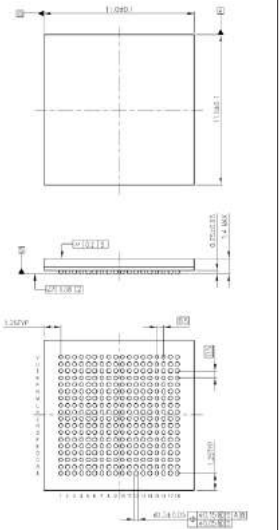
PLFBGA170

Package dimension unit : mm



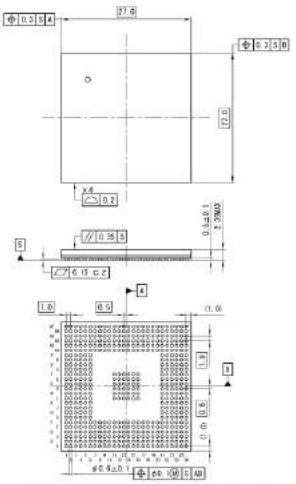
PLFBGA324

Package dimension unit : mm



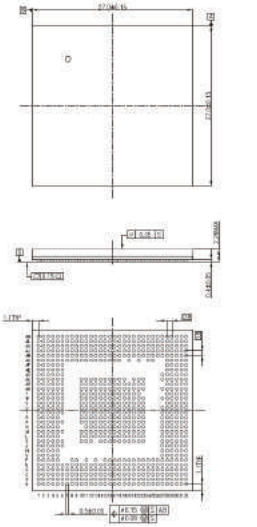
PBGA516

Package dimension unit : mm



PFBGA796

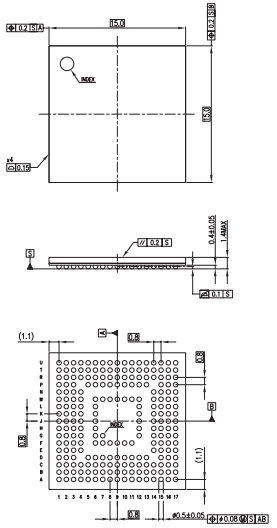
Package dimension unit : mm



Packages

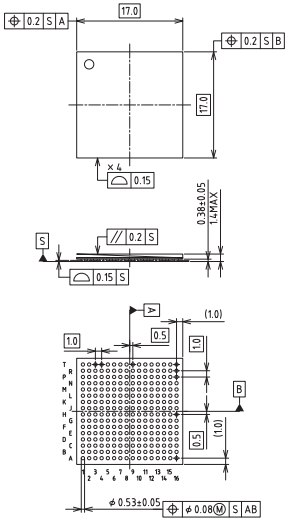
P-FBGA228

Package dimension unit : mm



P-LBGA256

Package dimension unit : mm



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