

Electronic Energy Meter

Table of Contents	
COMMUNICATION INTERFACE, IR data I/O.....	3
COMMUNICATION INTERFACE, status indicator.....	4
MAIN CIRCUIT, feedback.....	5
MAIN CIRCUIT, voltage stabilization.....	6
MEASURING UNIT, shunt resistor.....	7
MEASURING UNIT, voltage detection.....	8
POWER SUPPLY, current rectification.....	9
POWER SUPPLY, EMI/RFI filter and capacitive coupling.....	10
POWER SUPPLY, energy buffering.....	11
POWER SUPPLY, overvoltage protection.....	12
POWER SUPPLY, surge current limiter.....	13

Electronic Energy Meter

VISHAY components used for electronic energy meters include:

- Film Capacitors
 - Ceramic Capacitors, Multilayer
 - Al Electrolytic Capacitors
 - Varistors
 - Rectifier Diodes
 - Zener Diodes
 - Optocouplers
 - LEDs
 - IR detectors
 - IR emitters
 - Thick Film Chip Resistors
 - Thin Film Chip Resistors
-

Application Overview

Modern solid-state electronic energy meters (also known as kilowatt-hour meters, etc.) employ recently developed electronic components to measure electrical energy. Basic electronic meters are not just more cost-effective than mechanical meters, but offer further benefits: measurement accuracy of the electronic meter is about an order of magnitude better than that of a mechanical meter, while power consumption is lower by about two orders of magnitude. The electronic energy meter is also better protected against tampering than its mechanical predecessor, and units for prepaid operation (e.g., card readers) and remote meter reading (e.g., wireless, telephone line, or internet) can easily be included.

Electronic Energy Meter : COMMUNICATION INTERFACE, IR data I/O

IR detector

Product Name	Status	Description	Features	Package	Q-Level
BPV10		leaded IR detector; PIN photodiode	940 nm	TH / Radial D: 5 mm (T-1 3/4)	

IR emitter

Product Name	Status	Description	Features	Package	Q-Level
TSAL 4400		leaded IR emitter with high radiant power	940 nm	TH / Radial D: 3 mm (T-1)	
TSAL 6100		leaded IR emitter with high radiant power	940 nm	TH / Radial D: 5 mm (T-1 3/4)	

Electronic Energy Meter : COMMUNICATION INTERFACE, status indicator

LED

Product Name	Status	Description	Features	Package	Q-Level
TLHx4200		leaded LED, green, orange, red	green, orange, red tinted clear package	TH / Radial D: 3 mm	
TLHx4400		leaded LED, green, orange, red	green, orange, red tinted diffused package	TH / Radial D: 3 mm	
TLMx1100		SMD LED, green, orange, red	green, orange, red small SMD package with exceptional brightness	SMD size 0603 CHIP	
TLUx240x		leaded LED, green, orange, red	green, orange, red tinted diffused package	TH / Radial D: 1.8 mm	

Electronic Energy Meter : MAIN CIRCUIT, feedback

Optocoupler

Product Name	Status	Description	Features	Package	Q-Level
SFH610x		SMD or leaded optocoupler phototransistor output; high reliability	VISO = 5300 VRMS; Tamb: -55 to +100°C CTR: 40% to 320%	SMD / TH-DIP SMD-4 or DIP-4	DIN EN (V UL/CSA BSI

Electronic Energy Meter : MAIN CIRCUIT, voltage stabilization

Resistor

Product Name	Status	Description	Features	Package	Q-Level
CRCW....e3		thick film chip resistor, SMD	1 Ohm to 10 Mohms E24-, E96-series; excellent stability	SMD 0201 to 2512 CHIP	
MCx		thin film chip resistor, SMD	1 Ohm to 10 MOhms; low tol.; low TC; excellent stability	SMD 0402 to 1206 CHIP	

Zener Diode

Product Name	Status	Description	Features	Package	Q-Level
BZG04		SMD diode	Zener and surge current specification	SMD DO-214AC (SMA)	
BZM55		SMD diode	Vz = 2.4 V to 75V; max.Tj = 175°C Very high stability	SMD MicroMELF glass case	
BZT55		SMD diode	Vz = 2.4V to 75V; max.Tj = 175°C Very high stability	SMD QuadroMELF, SOD8 glass case	
TZM		SMD diode	Vz = 2.4V to 75V; max.Tj = 175°C Very high stability	SMD MiniMELF, SOD80 glass case	

Electronic Energy Meter : MEASURING UNIT, shunt resistor

Shunt resistor

Product Name	Status	Description	Features	Package	Q-Level
WSMS5515	NEW	Power Metal Strip, Meter Shunt Resistor Very Low Ohmic Value; 5-Terminal Connection Design	R0001 - R0005; 5% Very Low TCR 3-W power rating;		null

Electronic Energy Meter : MEASURING UNIT, voltage detection

precision resistor

Product Name	Status	Description	Features	Package	Q-Level
MMA 0204 Precision		MELF precision resistor	10 Ohm to 511 kOhm low tol.; low TC superior stability;	SMD 0204 MELF	

Electronic Energy Meter : POWER SUPPLY, current rectification

Rectifier Diode

Product Name	Status	Description	Features	Package	Q-Level
1N400x		leaded rectifier diode	IF = 1 A; IFSM = 45 A; Vf = 1.1V; max.Tj = 150°C	TH / Axial DO-204AL (DO-41)	
1N400xGP		leaded rectifier diode	IF = 1 A; IFSM = 30 A; Vf = 1.1V; max.Tj = 175°C	TH / Axial DO-204AL (DO-41)	
MSE1Px	NEW	SMD rectifier diode	IF = 1.5 A; IFSM = 30 A; Vf = 1.4V; max.Tj = 150°C trr = 25 ns; Er = 20 mJ	SMD (uSMP)	
S1Px	NEW	SMD rectifier diode	IF = 1.5 A; IFSM = 30 A; Vf = 1.15V; max.Tj = 175° Er = 20 mJ	SMD DO-220AA (SMP)	

Electronic Energy Meter : POWER SUPPLY, EMI/RFI filter and capacitive coupling

Filter and coupling capacitors

Product Name	Status	Description	Features	Package	Q-Level
F 1772-2 310 V-X2		leaded X2 film capacitor	Cap.range: 0.01uF - 2.2uF 310 VAC rated; self-healing	TH / Radial 5*11*17.5 to 15.5*28.5*41.5mm	EN/IEC UL/CSA
F1772-4000		leaded X2 film capacitor	Cap.range: 0.001 uF-1uF 440 VAC rated; self-healing	TH / Radial	EN/IEC UL/CSA CQC
MKP 338 6 Y2		leaded Y2 film capacitor	Cap.range: 0.001 uF-0.47 300 VAC rated; self-healing	TH / Radial	EN/IEC UL/CSA
MKT 334	NEW	leaded film capacitor in series with mains; do NOT use across the line!	self-healing; excellent long term stability of capacitance	TH / Radial 4.0*10.0*12.5 to 15*25*31.5 mm	

Electronic Energy Meter : POWER SUPPLY, energy buffering

Buffer Capacitor

Product Name	Status	Description	Features	Package	Q-Level
136 RVI		Radial Very low impedance	10 V to 100 V; 22 μ F to 10000 μ F Life@105°C=4000-10000h	TH / Radial 10x12 to 18x35	
150 RMI		Radial Very low impedance	10 V to 100 V Life@105°C=4000-10000h	TH / Radial 8x12 to 18x31	AEC Q200

Electronic Energy Meter : POWER SUPPLY, overvoltage protection

Varistor

Product Name	Status	Description	Features	Package	Q-Level
VDRH - - .E 2381 58. ...		leaded varistor	max. Vrms = 680 V; max. trans. curr. = 10 kA	TH / Radial	
VDRS - - .E 2381 59. ...		leaded varistor	max. Vrms = 680 V; max. trans. curr. = 6.5 k	TH / Radial	

Voltage regulating power diode

Product Name	Status	Description	Features	Package	Q-Level
PTVx	NEW	SMD voltage regulator diode	Clamps at 3.9 V to 36 V; epoxy meets UL94V-0 flammability rating	SMD DO-220AA (SMP)	

Electronic Energy Meter : POWER SUPPLY, surge current limiter

Power Resistor

Product Name	Status	Description	Features	Package	Q-Level
CMB 0207		carbon film resistor	2.2 Ohms to 1.5 Mohms superior power rating; high pulse capability	SMD 0207 MELF	
MMx		thin film MELF resistor, SMD	0.22 Ohms to 10 Mohms low tol.; low TC; high P; excellent stability;	SMD 0102 to 0207 MELF	
SMM0207		thin film MELF resistor, SMD	0.16 Ohms to 10 MOhms; high power rating; excellent stability;	SMD 0207 MELF	
Z300		Axial Cemented Wirewound Resistor Non flammable	0.3 Ohms to 8.2k Ohms, 1W to 10W power rating; high pulse capability	TH / Axial	

