ENGINEERING DATA SHEET

P111 SERIES

SOLID STATE AC RELAY
SINGLE PHASE, 250 VAC, 400 HZ
25 AMP RATING

SIZE: 69.78 x 34.04 x 10.20 mm

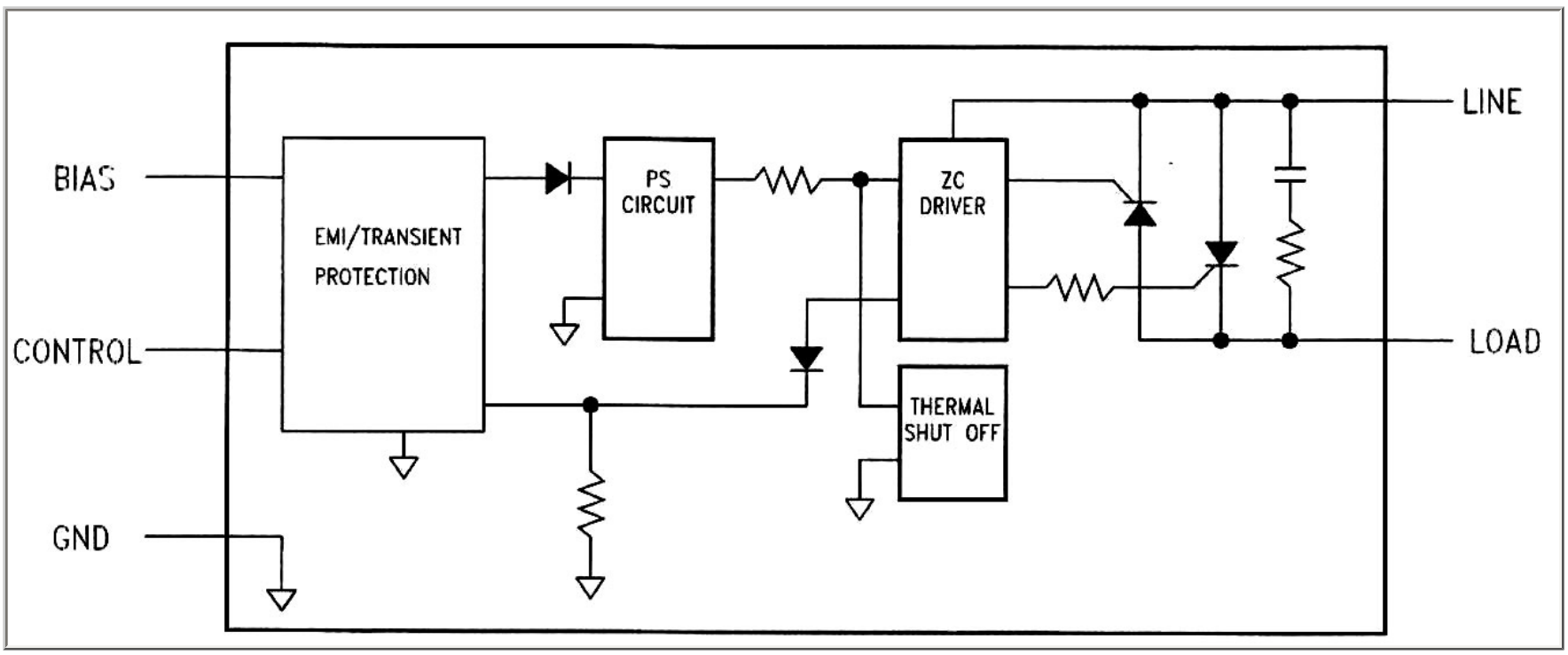
DESCRIPTION

The P111 Series of Solid State Relays are single pole normally open devices rated for 250 Vac, 400 Hz, up to 25 amperes. The device features zero voltage cross turn-on and zero current cross turn-off. The advance packaging provides a low thermal impedance and low voltage drop. Pins are fabricated of special low resistivity material for improved voltage drop. Zero cross switching of load, 1500 Vrms optical isolation, over-temperature protection, and light weight make this a state of art AC relay.

FEATURES

- Optical Input to output isolation
- Built in snubber
- Over-temperature protection
- Zero voltage turn-on
- Zero current turn-off
- Low voltage drop
- Low power dissipation
- Low thermal impedance
- Meets EMI susceptibility of RTCA/DO-160D
- TTL and CMOS compatable
- High dv/dt rating
- Light weight
- Satisfies MIL-R-28750C/10 Performance requirements

BLOCK DIAGRAM



ORDERING INFORMATION

P111-B253-S001:	Leach Standard Screening Part
P111-B253-S301:	Leach Standard Qualified Screening Part

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Input Parameters when used in 2 terminal configuration, (Control connected to GND)						
Parameter	Symbol	Min	Typ	Max	Unit	Note
BIAS on voltage	V_{ihb}	3.8		32	Vdc	Note Fig 1
BIAS off voltage	V_{ilb}			1.5	Vdc	
BIAS on current	I_{ihb}		14	16	mA	V_{BIAS} = 5 VDC,
				16	mA	V_{BIAS} = 32 VDC,
BIAS off current	I_{ilb}			250	µA	V_{BIAS} = 1.5 VDC,
				-2	mA	V_{BIAS} = -32 VDC, Reverse protection
Input Parameters when used in 3 terminal configuration						
Parameter	Symbol	Min	Max	Unit	Note	
CONTROL on voltage	V_{ilc}	-2.5	1.2	Vdc	V_{BIAS} = 5 VDC	
CONTROL off voltage	V_{ihc}	2.4	18	Vdc	V_{BIAS} = 5 VDC	
CONTROL on current	I_{ilc}		16	mA	V_{BIAS} = 5 VDC, $V_{Control}$ = 0.0VDC	
CONTROL off current	I_{ihc}		1	mA	V_{BIAS} = 5 VDC, $V_{Control}$ = 2.4VDC	
			-1.2	mA	V_{BIAS} = 5 VDC, $V_{Control}$ = 18VDC	
Output Parameters						
Parameter	Symbol	Min	Max	Unit	Note	
Load current	I_l	0.2	25	A_{rms}		
Load voltage	V_l	20	250	V_{rms}		
Frequency	f	40	440	Hz		
On state voltage drop	V_{ld}		1.5	V_{rms}	I_l = 25 A_{rms}	
Leakage Current	I_{ll}		14	mA_{rms}	V_l = 250 V_{rms}, f = 400 Hz	
Power Dessipation	P_d		37.5	W	I_l = 25 A_{rms}	
Turn on time	T_{on}		1/2	Cycle		
Turn off time	T_{off}		1	Cycle		
Transient voltage	V_{tr}		±500	V_{peak}	T ≤ 5 sec	
Surge current	I_{sg}		200	A_{rms}	Note Fig 2	
Power factor (Load)	P_f	0.2				
DC offset voltage	V_{dcov}		±100	mV	2.5 A_{rms} ≤ I_l ≤ 25 A_{rms}	
Waveform distortion	V_{wd}	4		V_{rms}	2.5 A_{rms} ≤ I_l ≤ 25 A_{rms}	
Zero voltage turn on	V_z		±10	V_{peak}	Temp = 25°C, V_l = 250 V_{rms}, I_l = 25 A_{rms}, f = 400 Hz	
			±15	V_{peak}	All temp, V_l = 250 V_{rms}, I_l = 25 A_{rms}, f = 400 Hz	
dv/dt		200		V/µS		
Output capacitance			2500	pf		
Input to Output capacitance			20	pf		

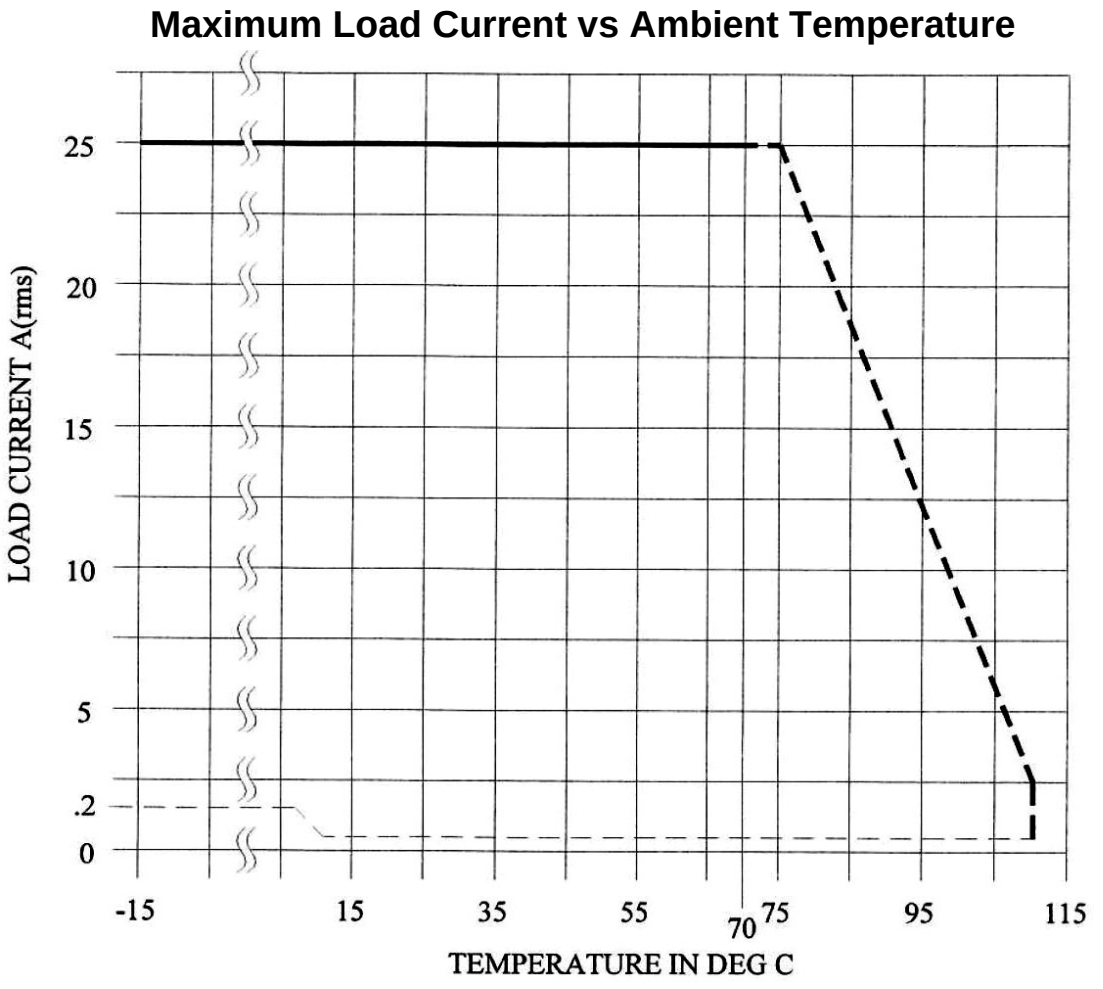
Isolation Data

Parameter	Symbol	Min	Unit	Note
Dielectric Strength	V_{iso}	1500, @see level 750, @41000 ft	V_{rms}, 60Hz	1 minute, Input to, Output ($I_{Leakage}$ <1ma) all pins to case ($I_{Leakage}$ <1ma)
Insulation resistance	R_{ins}	1000	MΩ	15 sec, Input to Output at 500 VDC all pins to case at 500 VDC

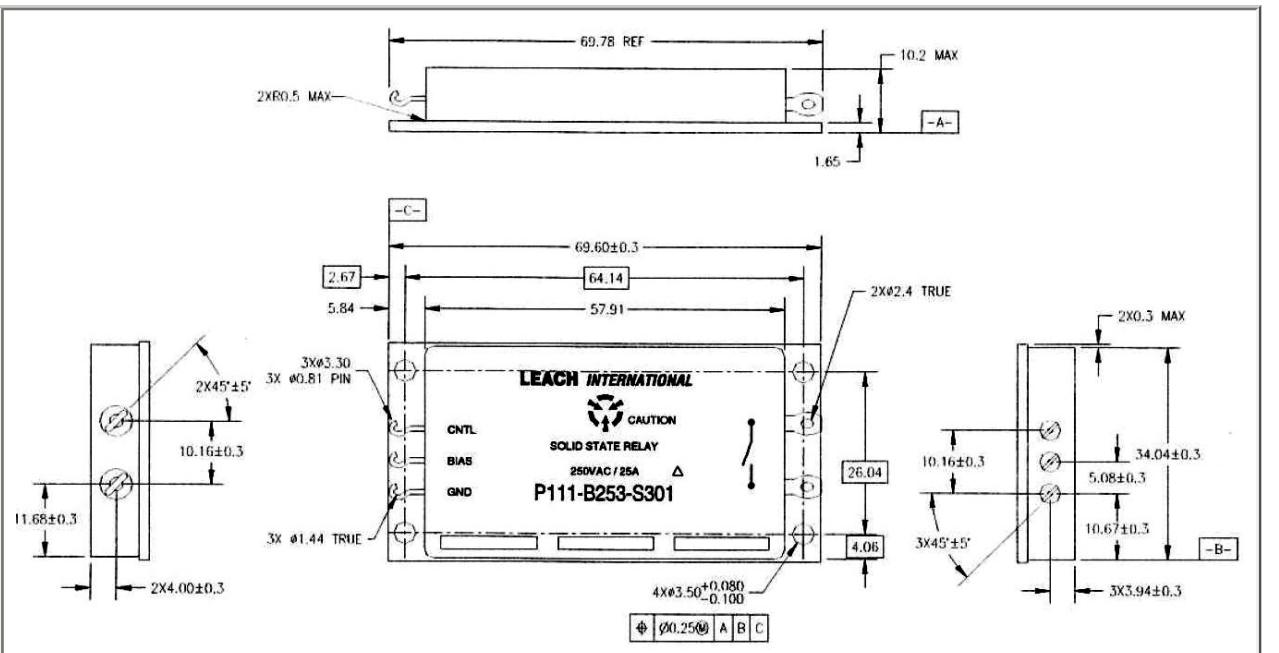
Environmental Data

Parameter	Symbol	Min	Max	Unit	Note
Operational temp. range	T_{op}	-25	+70	°C	At full load, Note thermal derating
Survival temp. range	T_{sl}	-55	+85	°C	
Storage temp. range	T_{st}	-55	+125	°C	
Max. junction temperature of output stage	T_{jmax}		175	°C	
Thermal Trip temp.	T_{trp}		150	°C	Output SCRs junction temperature, device will shut off. To activate when device is cooled down, BIAS has to be switched off and then switched on.
Lead Temperature (Soldering 10 seconds)			210	°C	
Acceleration (Y1 Axis only)		5000		g	Y1 axis only
Vibration		100		g	10 to 3000 Hz
Shock		1500		g	0.5 ms
Salt Atmosphere					Per MIL-STD-750 method 1041
Altitude		-1000	41000	Ft	
Mean time between failures	MTBF	200,000		h	per MIL-HBK-217F
Thermal Resistance, Junction to case	θ_{jc}		0.4	°C/W	
Humidity					Comply with RTCA/160D section 6.0, category A, para. 6.3.1

THERMAL DERATING



- CASE FINISH: Nickel Underlaying Gold
- TERMINALS: Nickel Underlaying Gold
- WEIGHT: 75 grams max.



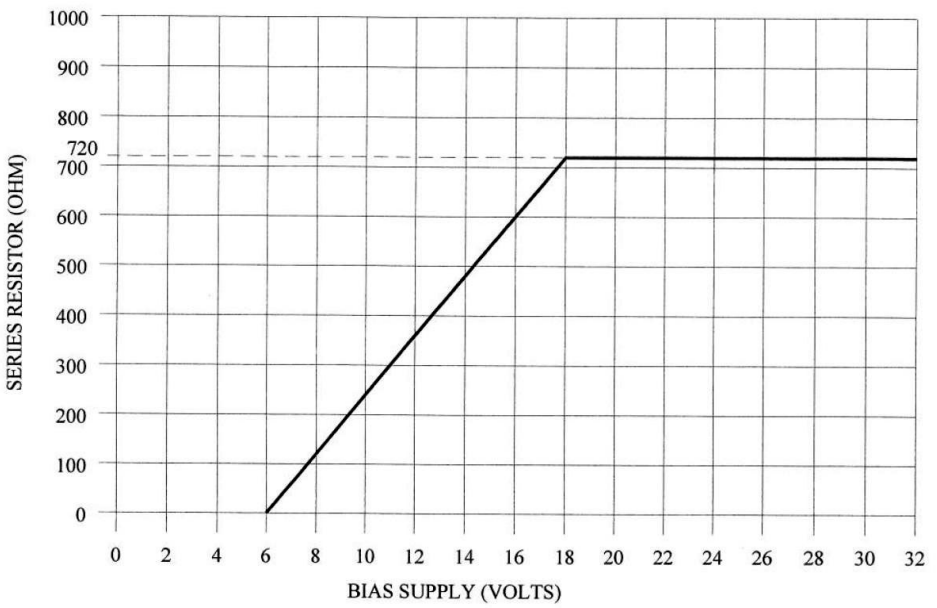


Figure 1. Series Resistor vs Bias Supply Voltage for V_{BIAS} 6V use Series Resistor R_S

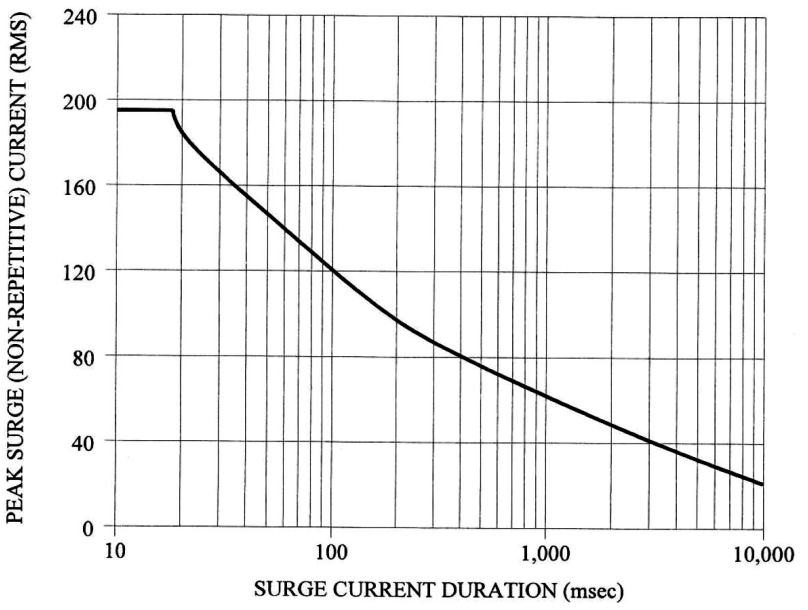


Figure 2. Peak Surge Current vs Surge Current Duration