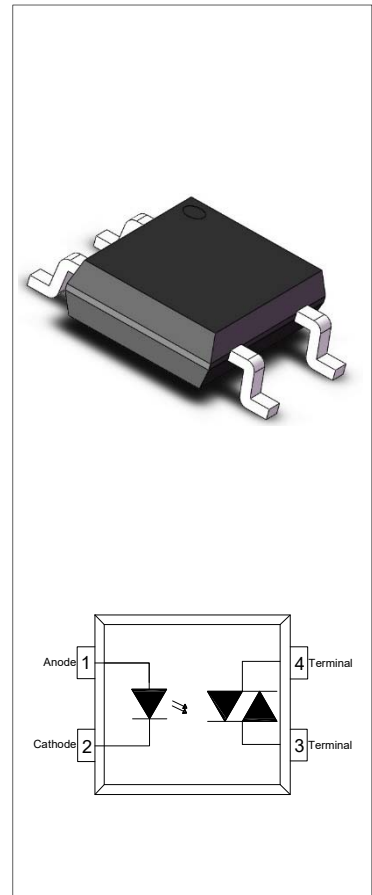


JOCSR21X-M4,JOCSR31X-M4 Series

Rev.A.1.0

DESCRIPTION:

The products are 4-pin thyristor opto-couplers. The device combines an AlGaAs infrared emitting diode as the emitter which is optically coupled to a monolithic silicon random-phase photo triac in a plastic SOP4 package. With the robust coplanar double mold structure, the device provides the most stable isolation feature. The products are widely used in solenoid/valve controls, lighting controls, motor controls, temperature controls, static AC power switches, solid state relays, interfacing microprocessors up to 265 V_{AC} peripherals.



MAIN FEATURES

High isolation 3750 VRMS

DC input with random-phase photo triac output

Operating temperature range -55 °C to 110 °C

REACH & RoHS compliance

HBM: H3A; MM: M4; CDM: C3

CQC approved

VDE approved

UL approved

ABSOLUTE MAXIMUM RATINGS (Temperature=25°C)

Parameter		Symbol		Value	Unit
Input	Forward Current	I _F		50	mA
	Peak Forward Current	I _{FP}		1 ^①	A
	Reverse Voltage	V _R		6	V
	Power Dissipation	P _D		75	mW
Output	Off-state Output Terminal Voltage	V _{OFF}	JOCSR21X	600	V
			JOCSR31X	800	
	Peak On-state Current (100μs pulse, 120 pps)	I _{TP}		2	A
	On-state RMS Current	I _{T(RMS)}		100	mA
	Peak Repetitive Surge Current (P _W =10 ms)	I _{TSM}		1.2	A
	Output Power Dissipation	P _O		250	mW
Total Power Dissipation		P _{tot}		325	mW

Isolation Voltage	V_{iso}	3750 ^②	Vrms
Operating Temperature	T_{opr}	-55~110	°C
Junction Temperature	T_j	125	°C
Storage Temperature	T_{stg}	-55~125	°C
Soldering Temperature	T_{sol}	260	°C
Peak pulse voltage ($T_j=25^{\circ}\text{C}$; non-repetitive,off-state)	V_{pp}	1	kV

NOTE1: 100 μ s pulse, 100Hz frequency

NOTE2: AC for 1minute, R.H.=40~60%

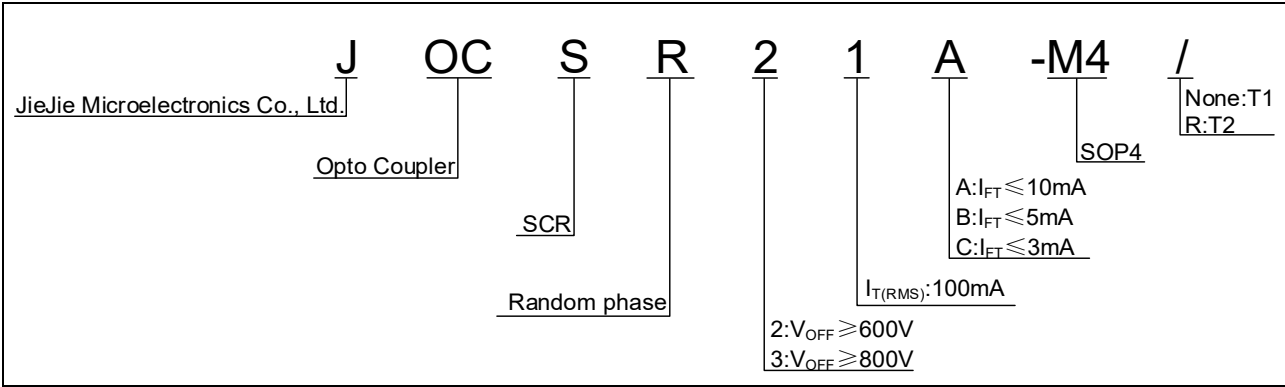
ELECTRICAL CHARACTERISTICS (Temperature=25°C)

Parameter			Symbol	Condition	Min.	Typ.	Max.	Unit
Input	Forward Voltage		V_F	$I_F=10\text{mA}$	-	1.2	1.5	V
	Reverse Current		I_R	$V_R=6\text{V}$	-	-	1	μA
	Input Capacitance		C_{in}	$V=0, f=1\text{kHz}$	-	14	-	pF
Output	Peak Off-state Current, Either Direction		I_{OFF}	$V_{OFF}=\text{Rated } V_{OFF}$ $I_F=0$	-	-	100 ^③	nA
	Peak On-state Voltage, Either Direction		V_{TM}	$I_{TM}=100\text{mA}$	-	2	2.5	V
	Critical Rate of Rise of Off-state voltage		dV/dt	$V_{PEAK}=\text{Rated } V_{PEAK}$ $I_F=0$	2000 ^④	-	-	V/ μ s
Transfer Characteristics	LED Trigger Current	JOCSR21A JOCSR31A	I_{FT}	Terminal Voltage=3V $I_{TM}=100\text{mA}$	-	-	10	mA
		JOCSR21B JOCSR31B			-	-	5	
		JOCSR21C JOCSR31C			-	-	3	
	Holding Current		I_H	$I_{TM}=2\text{mA}$, $I_F=\text{Rated } I_{FT}$	-	500	-	μA
	Isolation Resistance		R_{ISO}	DC500V 40~60%R.H.	10^{12}	10^{14}	-	Ω
	Floating Capacitance		C_{IO}	$V=0$, $f=1\text{MHz}$	-	5	-	pF
	Response Time		t_{on}	$V_D=6\text{V}$, $R_L=100\Omega$, $I_F=20\text{mA}$	-	15	50	μs

NOTE3: Test voltage must be applied within dV/dt ratings.

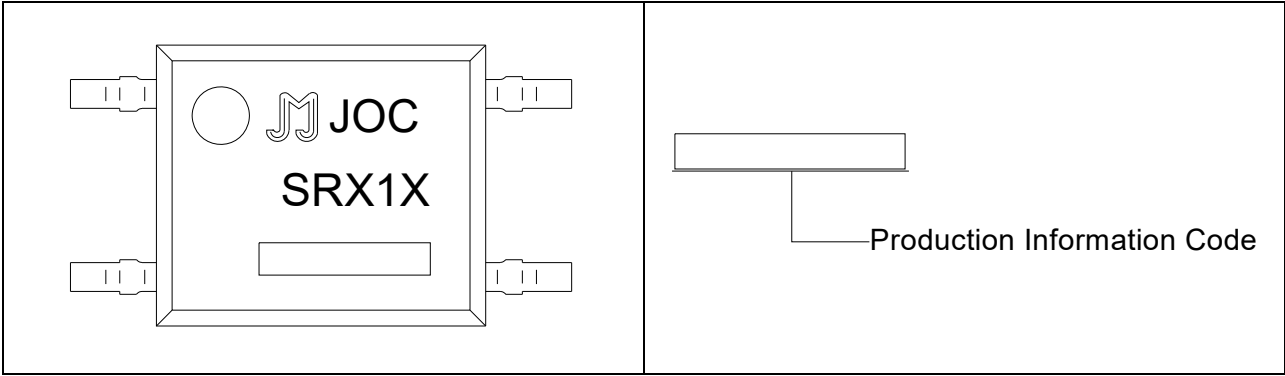
NOTE4: Refer to Fig.14 & Fig.15

ORDERING INFORMATION



Packing Quantity			
Option	Quantity	Quantity – Inner box	Quantity –Outer box
SOP4	3000 Units/Reel	2 Reels/Inner box	5 Inner box/Outer box =30k Units

MARKING



Characteristics Curves

FIG.1: Max. Allowable LED Forward Current vs. Ambient Temperature

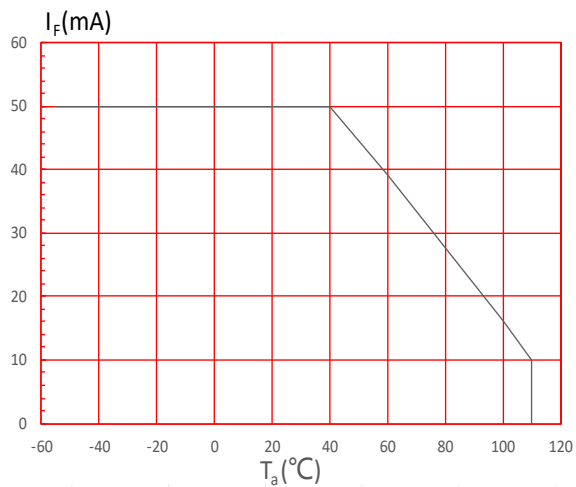


FIG.3: Forward Current vs. Forward Voltage

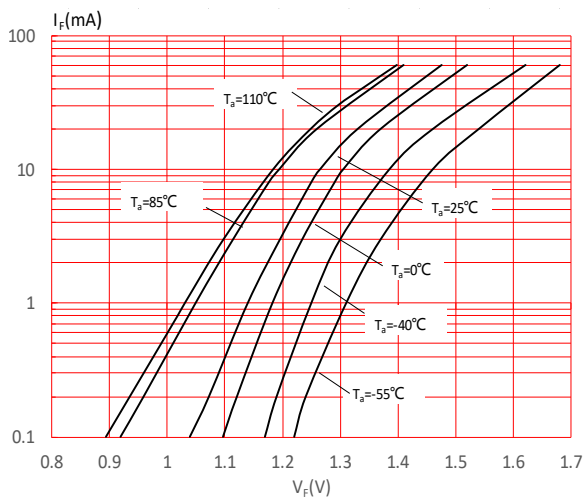


FIG.5: Normalized Off-state Terminal Voltage vs. Ambient Temperature

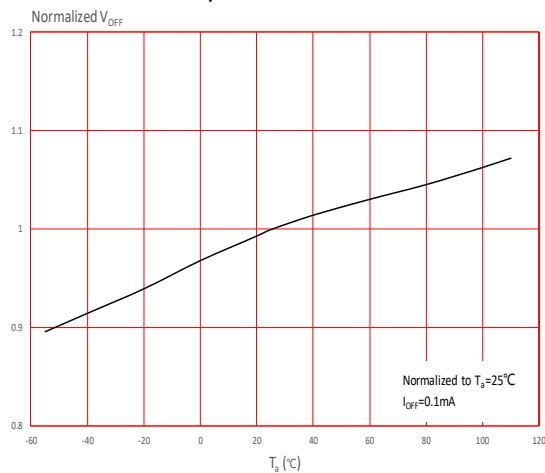


FIG.2: On-state Terminal Current vs. Ambient Temperature

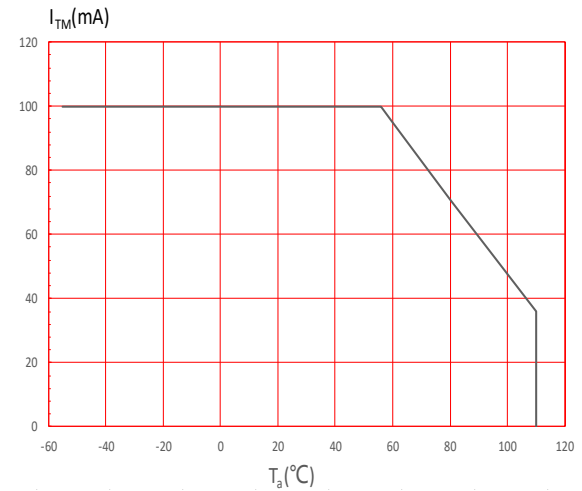


FIG.4: Normalized Off-state Terminal Current vs. Ambient Temperature

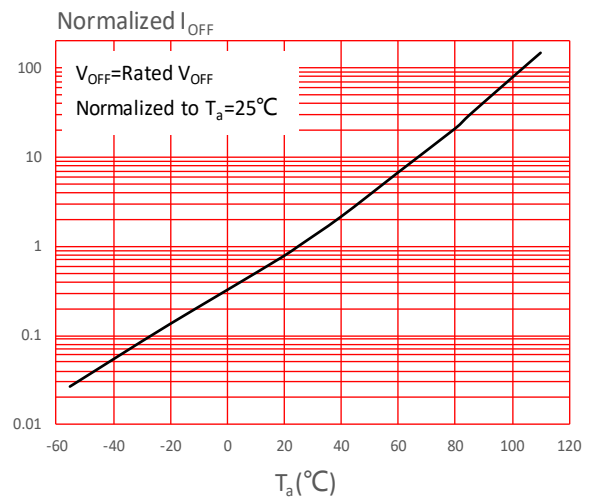


FIG.6: Normalized Trigger Current vs. Ambient Temperature

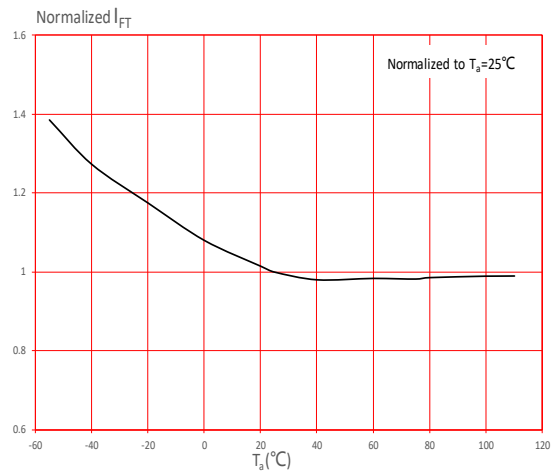


FIG.7: Normalized On-state Terminal Voltage vs. Ambient Temperature

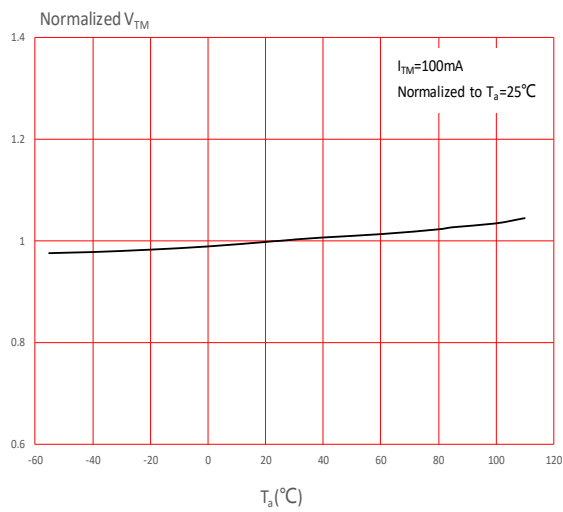


FIG.8: On-state Terminal Voltage vs. On-state Terminal Current

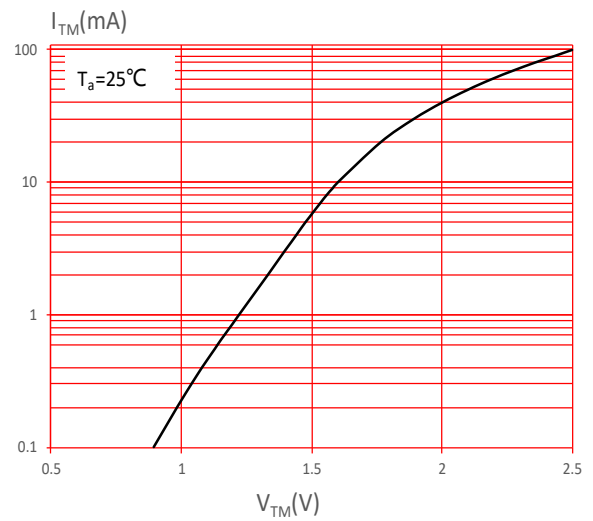


FIG.9: Normalized Holding Current vs. Ambient Temperature

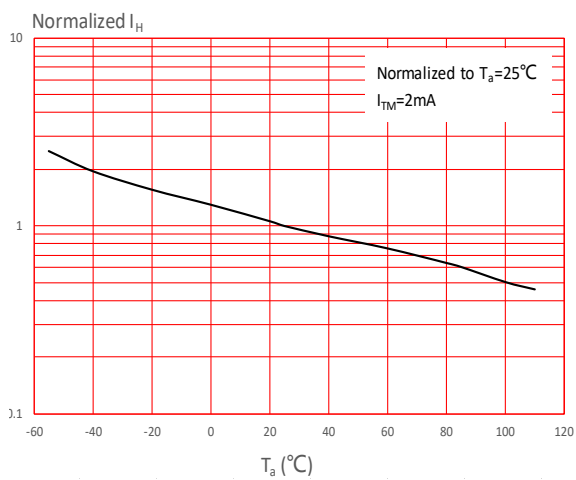


FIG.10: Turn On Time vs. Forward Current

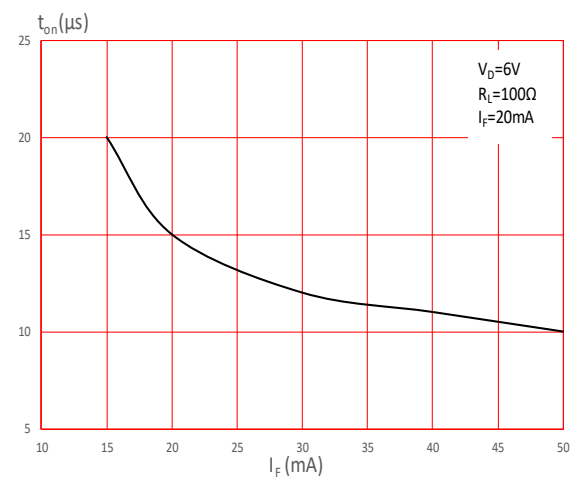
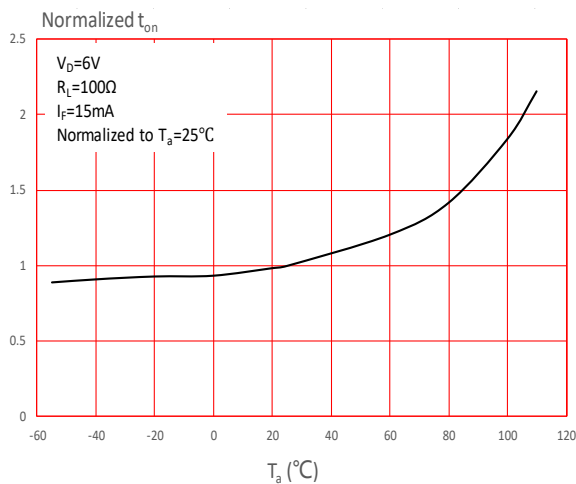


FIG.11: Normalized Turn On Time vs. Ambient Temperature



TEST CIRCUITS

FIG.12: Test Circuits of Turn On Time

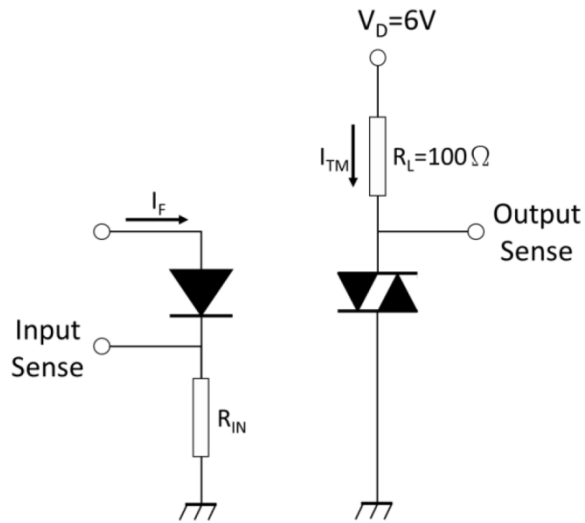


FIG.13: Waveforms of Turn On Time

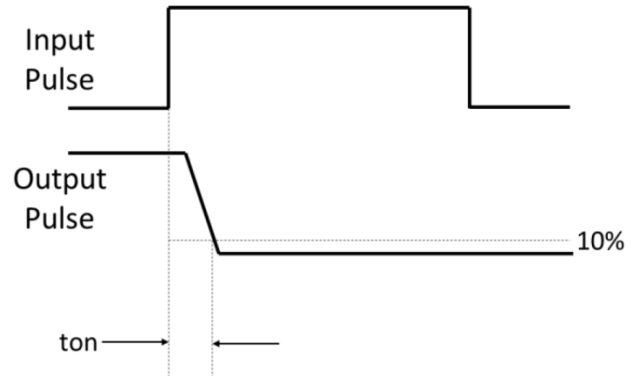


Fig.14: Test Circuits of dV/dt

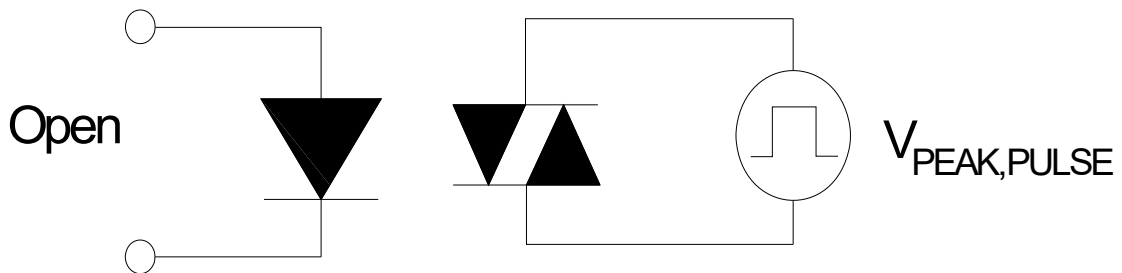


Fig.15: Waveforms of dV/dt

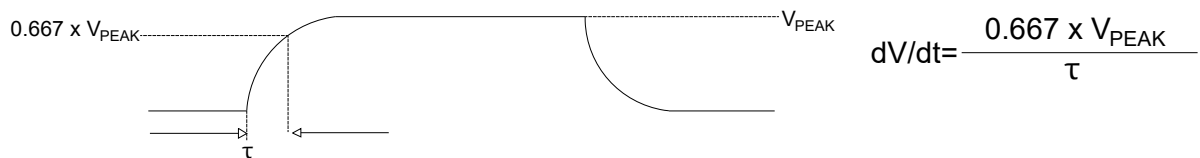
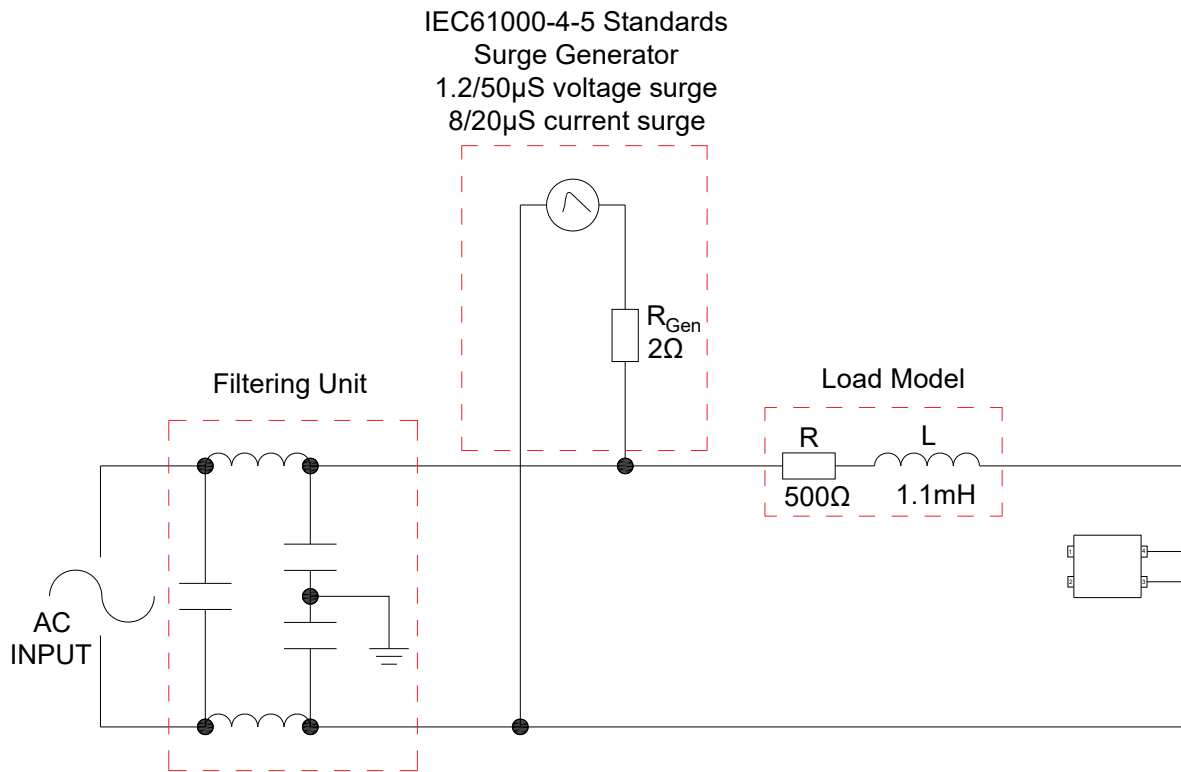
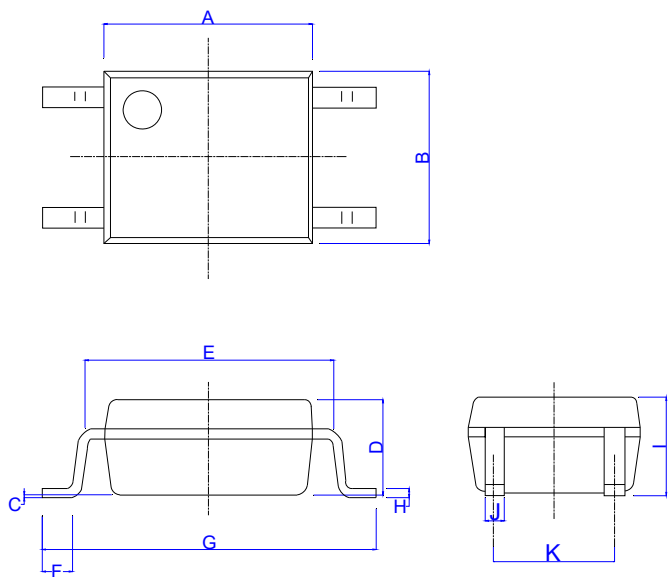


FIG.16: Test circuit for inductive and resistive loads to IEC-61000-4-5 standards

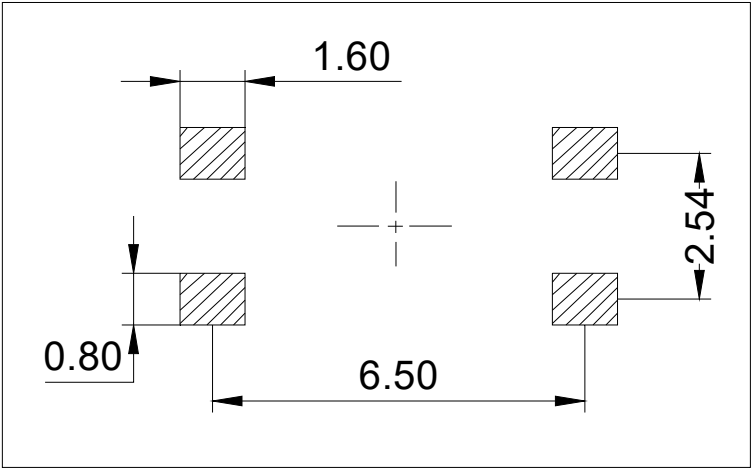


Package Dimension (Unit: mm)



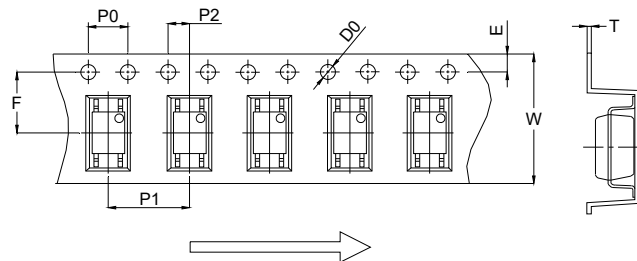
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.80	0.173		0.189
B	3.60		4.20	0.142		0.165
C	0.00		0.20	0.000		0.008
D	1.90		2.30	0.075		0.091
E	5.00		5.60	0.197		0.220
F	0.34		0.94	0.013		0.037
G	6.70		7.30	0.264		0.287
H	0.10		0.30	0.004		0.012
I	2.00		2.40	0.079		0.094
J	0.25		0.55	0.010		0.022
K	2.29		2.79	0.090		0.110

RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)



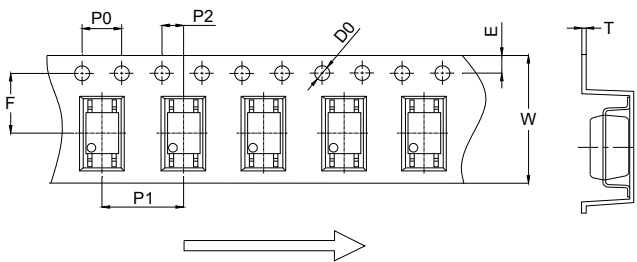
CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option None



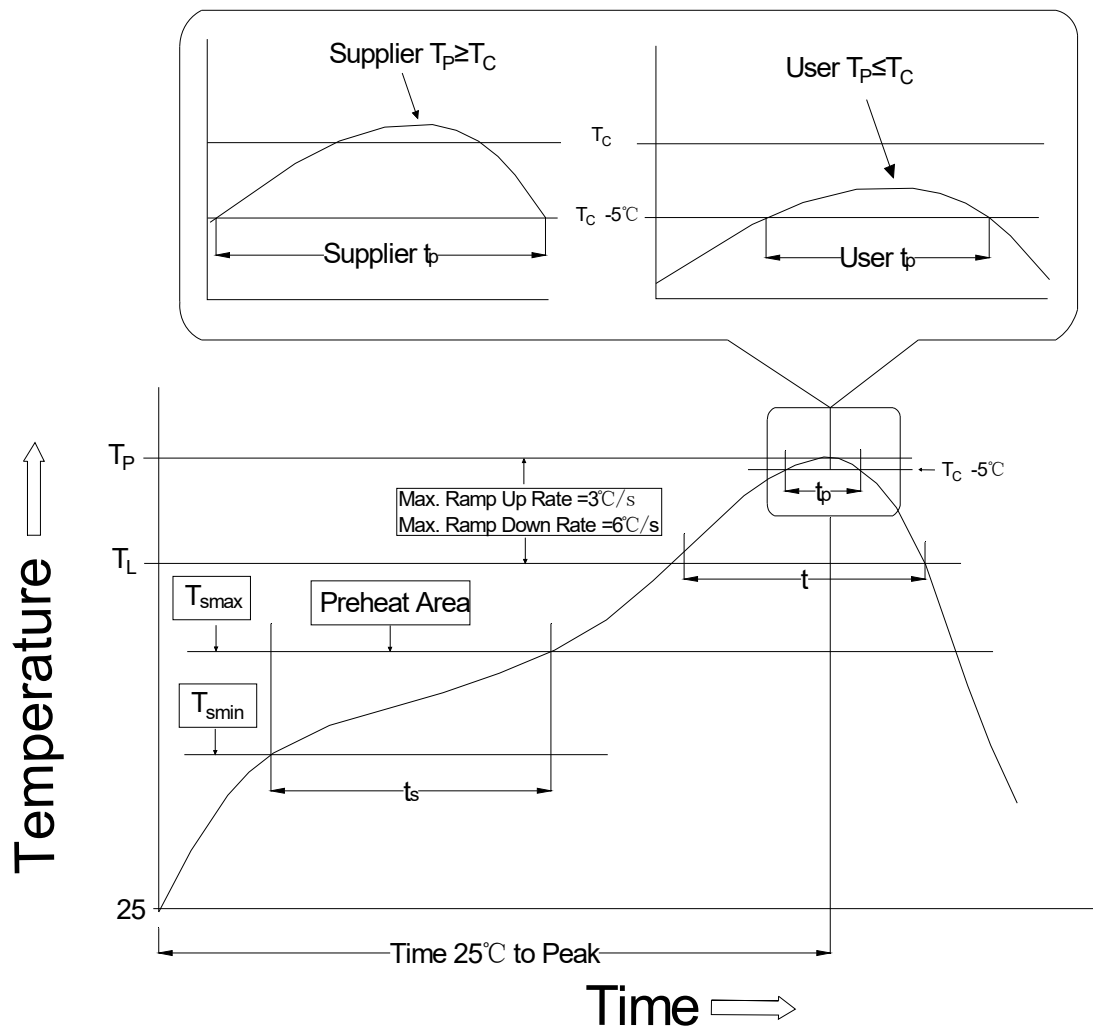
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D0		1.50	1.60		0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
E	1.65	1.75	1.85	0.065	0.069	0.073
F	4.40	4.50	4.60	0.173	0.177	0.181
T	0.25	0.30	0.35	0.010	0.012	0.014
W	11.90	12.00	12.30	0.469	0.472	0.484

Option R



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D0		1.50	1.60		0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
E	1.65	1.75	1.85	0.065	0.069	0.073
F	4.40	4.50	4.60	0.173	0.177	0.181
T	0.25	0.30	0.35	0.010	0.012	0.014
W	11.90	12.00	12.30	0.469	0.472	0.484

REFLOW INFORMATION



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	100°C	150°C
Temperature Max. (T_{smax})	150°C	200°C
Time (t_s) from (T_{smin} to T_{smax})	60-120 seconds	60-120 seconds
Ramp-up Rate (t_L to t_P)	$3^\circ\text{C/second max.}$	$3^\circ\text{C/second max.}$
Liquidus Temperature (T_L)	183°C	217°C
Time (t_L) Maintained Above (T_L)	60-150 seconds	60-150 seconds
Peak Body Package Temperature	$235^\circ\text{C} + 0^\circ\text{C} / -5^\circ\text{C}$	$260^\circ\text{C} + 0^\circ\text{C} / -5^\circ\text{C}$
Time (t_P) within 5°C of 260°C	10 seconds	10 seconds
Ramp-down Rate (T_P to T_L)	$3-6^\circ\text{C/second}$	$3-6^\circ\text{C/second}$
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

Note:

1. Reflow soldering is recommended at the temperatures and times shown, no more than three times.
2. Avoid direct contact between the epoxy body and any tools or surfaces exceeding its maximum storage temperature.
3. Application of pressure on the epoxy body is prohibited at elevated temperatures. In specific scenarios, any applied force must not exceed 2.5N.
4. Ensure the component has cooled to ambient temperature before proceeding with any subsequent manufacturing steps.
5. The component has a shelf life of one year when stored under standard conditions.
6. Recommend storage Temp.: 0~40°C;
Recommend storage humidity: <60%;
MSL level: MSL 1

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