



MPCS-155E Series

SOP5, DC Input, High Switching Time 1.0A Gate Driver Optocoupler

Description

The MPCS-155E series combine a red emitting diode as the emitter which is optically coupled to an integrated circuit with a power output stage in a plastic SOP5 package.

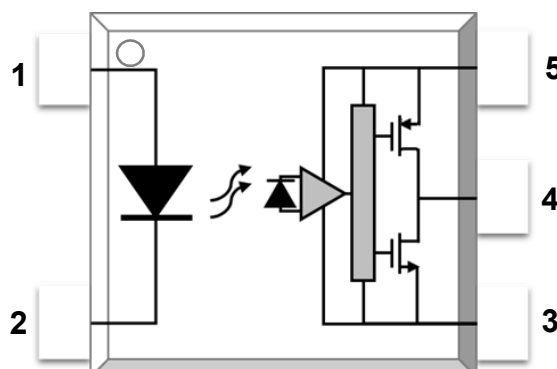
Features

- High isolation 3750 VRMS
- MSL class 1
- Guaranteed performance over temperature -40°C ~ +110°C.
- 1.0 A maximum peak output current
- Rail-to-rail output voltage
- Wide operating range: 10 to 30 Volts (V_{CC})

Applications

- Isolated IGBT/Power MOSFET gate drive
- Industrial Inverter
- AC brushless and DC motor drives
- Induction Heating

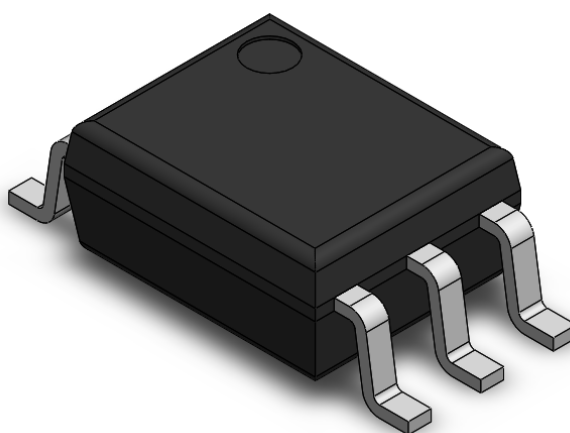
SCHEMATIC



PIN DEFINITION

1. Anode
2. Cathode
3. GND
4. V_O
5. V_{CC}

PACKAGE OUTLINE





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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT	Note
INPUT				
Forward Current	IF	25	mA	
Peak Forward Current	IFP	50	mA	1
Peak Transient Current	IF(trans)	1	A	2
Operating Frequency	f	50	kHz	
Reverse Voltage	VR	5	V	
Input Power Dissipation	PI	100	mW	
OUTPUT				
Supply Voltage	VCC	35	V	
Output Voltage	VO	35	V	
Peak Output Current	IO	1.0	A	
Output Power Dissipation	PO	150	mW	
COMMON				
Total Power Dissipation	Ptot	200	mW	
Isolation Voltage	Viso	3750	Vrms	3
Operating Temperature	Topr	-40~110	°C	
Storage Temperature	Tstg	-55~125	°C	
Soldering Temperature	Tsol	260	°C	4

Note 1. 50% duty, 1ms P.W

Note 2. $\leq 1\mu\text{s}$ P.W, 300pps

Note 3. AC For 1 Minute, R.H. = 40 ~ 60%

Note 4. For 10 seconds

TRUTH TABLE

LED	VDD-VSS "Positive Going" (Turn-on)	VDD-VSS "Negative Going" (Turn-off)	VO
Off	0V to 30V	0V to 30V	Low
On	0V to 6.5V	0V to 6V	Low
On	6.5V to 8.3V	6V to 8V	Transition
On	8.3V to 30V	8V to 30V	High



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RECOMMENDED OPERATION CONDITIONS

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Operating Temperature	TA	-40	110	°C
Supply Voltage	VCC	10	30	V
Input Current (ON)	IF(ON)	7	16	mA
Input Voltage (OFF)	VF(OFF)	0	0.8	V

ELECTRICAL OPTICAL CHARACTERISTICS (VCC=30V, VEE=GND, TA=25°C unless specified otherwise)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT CHARACTERISTICS							
Forward Voltage	VF	-	2.0	2.4	V	IF=10mA	
Reverse Current	IR	-	-	10	μA	VR=5V	
Input Capacitance	CIN	-	60	-	pF	V=0, f=1MHz	
OUTPUT CHARACTERISTICS							
High Level Supply Current	ICCH	-	1.7	3.7	mA	IF= 7mA to 10mA, VO= Open	
Low Level Supply Current	ICCL	-	2.0	3.7	mA	VF = 0 to 0.8V, VO= Open	
TRANSFER CHARACTERISTICS							
High Level Output Voltage	VOH	VCC-6.25	-	-	V	IF= 10mA, IO= -1.0A	
		VCC-0.25	-	-	V	IF= 10mA, IO= -100mA	
Low Level Output Voltage	VOL	-	0.15	0.6	V	VCC=5.5V, IF=5mA, VE=2.0V, ICL=13mA	
High Level Output Current	IOPH	-0.5	-	-	A	VO= VCC-3V	
		-1	-	-	A	VO= VCC-6V	
Low Level Output Current	IOPL	0.5	-	-	A	VO= VEE+3V	
		1	-	-	A	VO= VEE+6V	
Input Threshold Current	IFLH	-	0.8	5	mA	IO= 0mA, VO> 5V	
Input Threshold Voltage	VFHL	0.8	-	-	V	IO= 0mA, VO< 5V	
Isolation Resistance	Riso	10 ¹²	10 ¹⁴	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	CIO	-	0.3	1	pF	V=0, f=1MHz	



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ELECTRICAL OPTICAL CHARACTERISTICS (VCC=30V, VEE=GND, TA=25°C unless specified otherwise)							
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS							
Propagation Delay Time to Output Low Level	TPHL		60	110	ns	IF= 7 to 16mA, CL= 3nF, RL= 47Ω, f= 10kHz, Duty = 50%, TA= 25 °C	1
Propagation Delay Time to Output High Level	TPLH		50	110	ns		1
Pulse Width Distortion	TPHL-TPLH	-	10	100	ns		1
Propagation Delay Skew	tPSK	-	-	40	ns		1
Rise Time	tr	-	20	-	ns		1
Fall Time	tf	-	15	-	ns		1
Common Mode Transient Immunity at Logic High	CMH	20	-	-	kV/μs	IF=7 to 16mA VCC= 30V, RL= 350Ω, TA= 25 0C, VCM= 2kV	2
Common Mode Transient Immunity at Logic Low	CML	20	-	-	kV/μs	IF=0mA VCC= 30V, RL= 350Ω, TA= 25 0C, VCM= 2kV	3

All Typical values at $T_A = 25^\circ\text{C}$ and $V_{CC} - V_{SS} = 30\text{ V}$, unless otherwise specified; all minimum and maximum specifications are at recommended operating condition.

Note 1: Pin 2 needs to be connected to LED common.

Note 2: Common mode transient immunity in the high state is the maximum tolerable dV_{CM}/dt of the common mode pulse, V_{CM} , to assure that the output will remain in the high state (meaning $V_O > 10.0\text{V}$).

Note 3: Common mode transient immunity in a low state is the maximum tolerable dV_{CM}/dt of the common mode pulse, V_{CM} , to assure that the output will remain in a low state (meaning $V_O < 1.0\text{V}$).



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TYPICAL PERFORMANCE CURVES & TEST CIRCUITS

Fig.1 High output rail voltage vs. Temperature

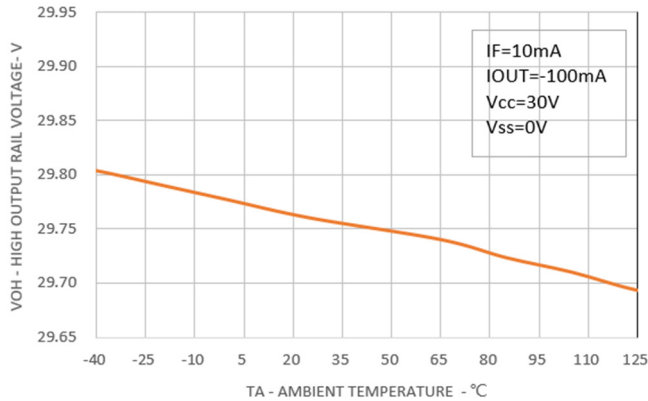


Fig.2 V_{OH} vs. Temperature

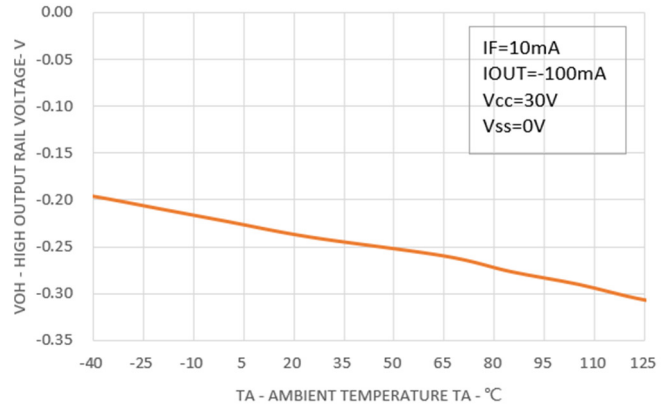


Fig.3 V_{OL} vs. Temperature

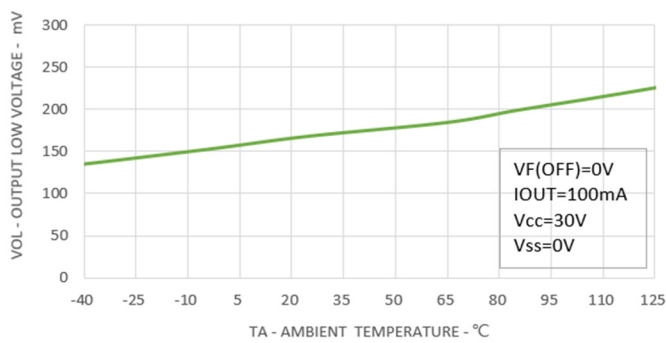


Fig.4 I_{CC} vs. Temperature

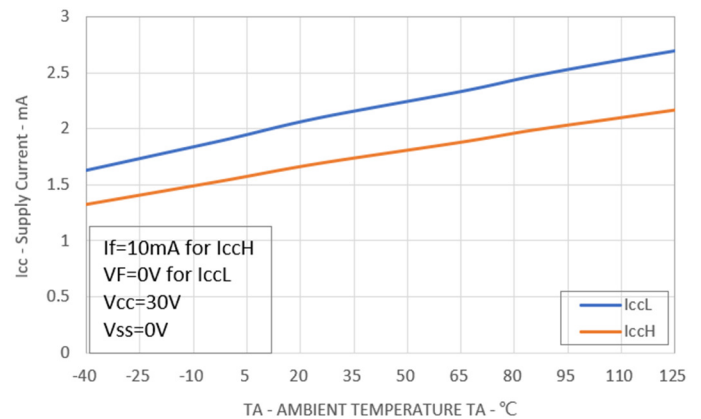


Fig.5 I_{CC} vs. V_{CC}

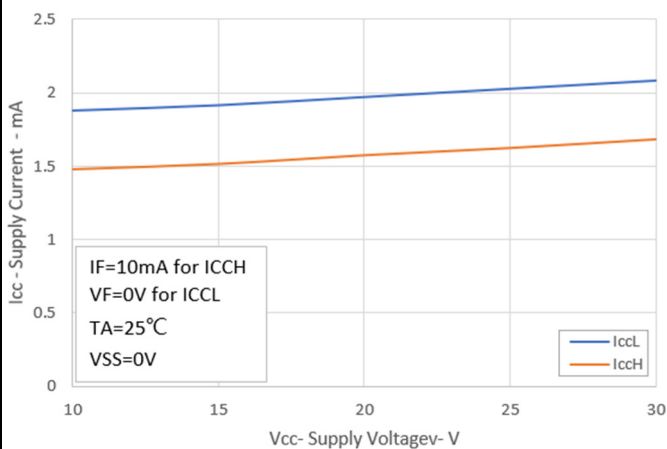
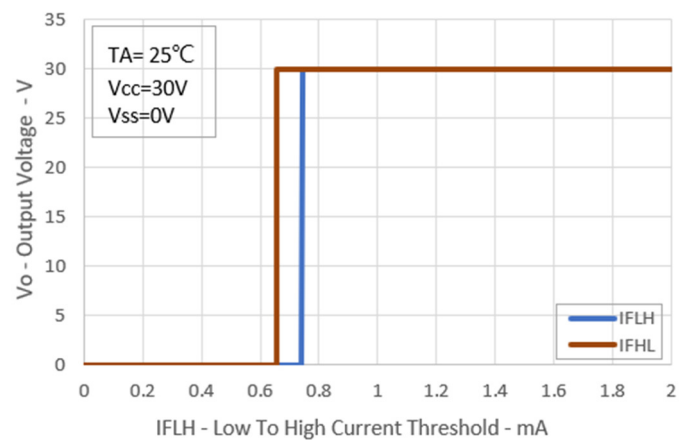


Fig. 6 I_{FLH} Hysteresis





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Fig.7 I_{FLH} vs. Temperature

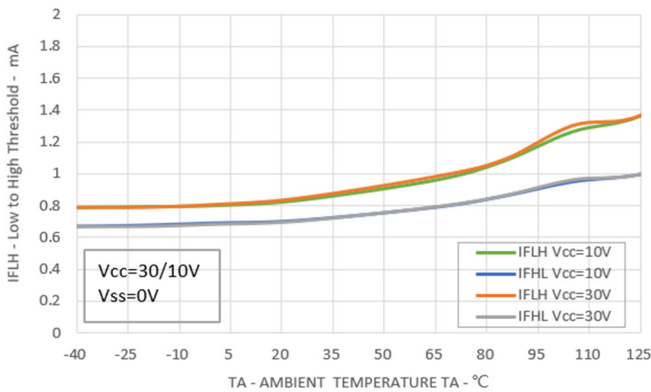


Fig.8 Propagation Delays vs. V_{CC}

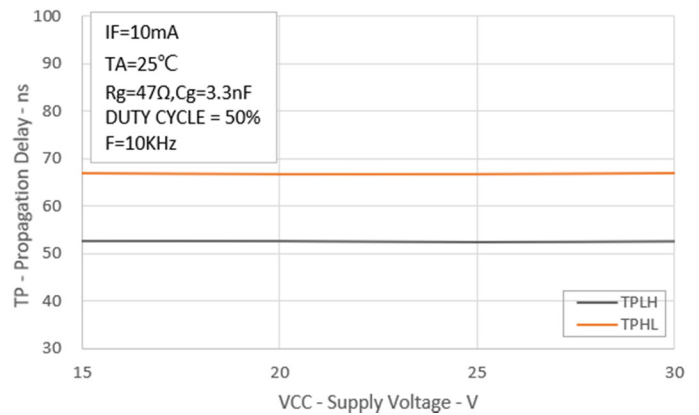


Fig.9 Propagation Delays vs. I_F

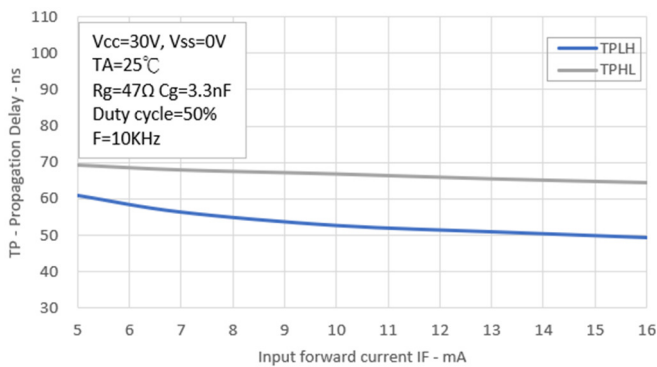


Fig.10 Propagation Delays vs. Temperature

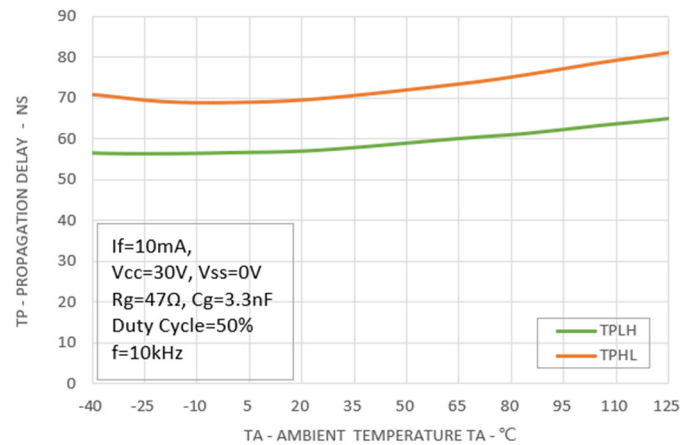


Fig.11 Propagation Delay vs R_g

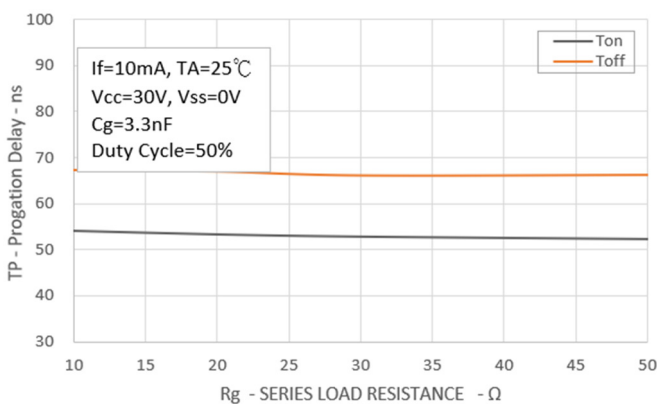


Fig. 12 Propagation Delay vs. C_g

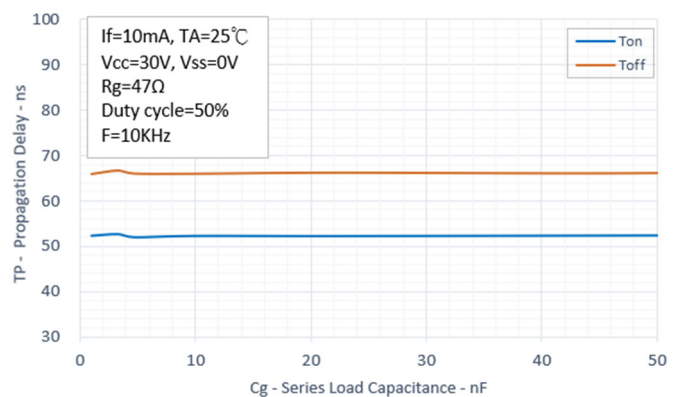


Fig.13 Input Current vs. Forward Voltage

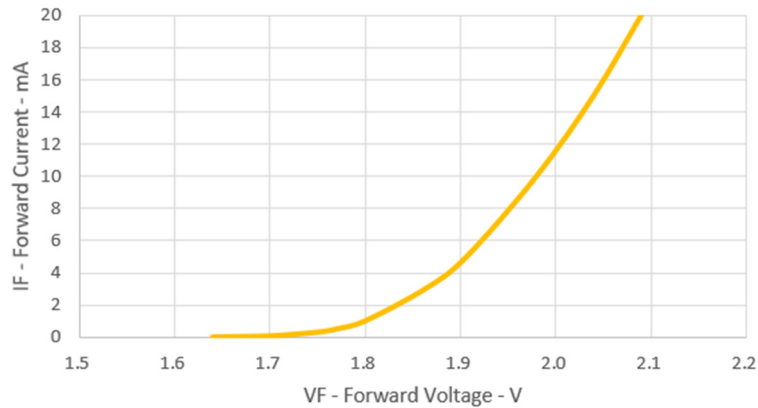


Fig.14 I_{OH} Test Circuit

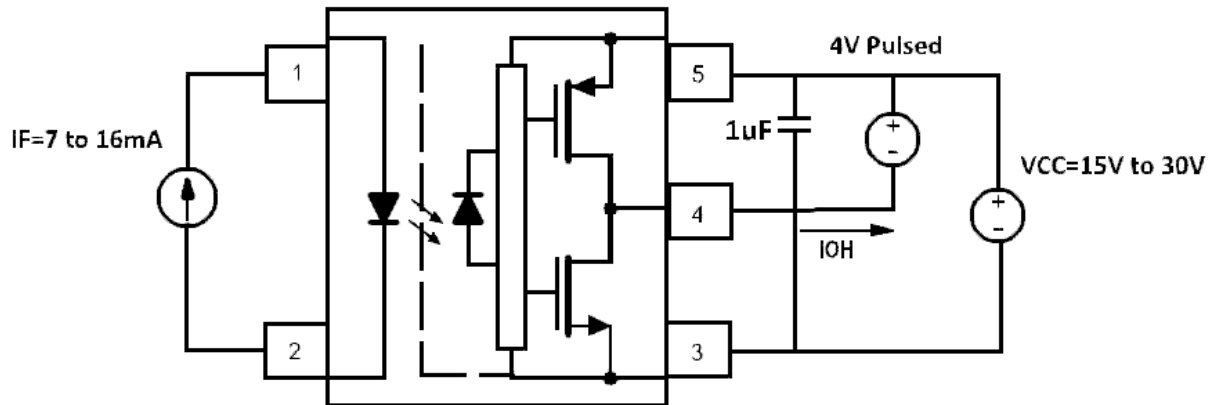


Fig.15 I_{OL} Test Circuit

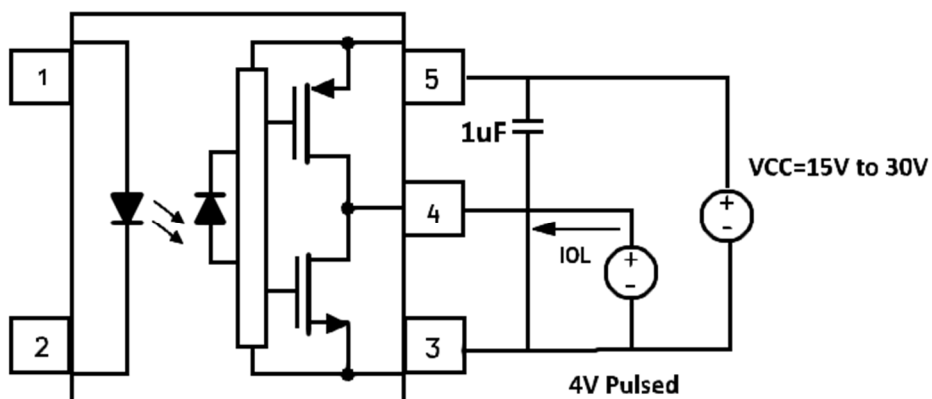


Fig.16 V_{OH} Test Circuit

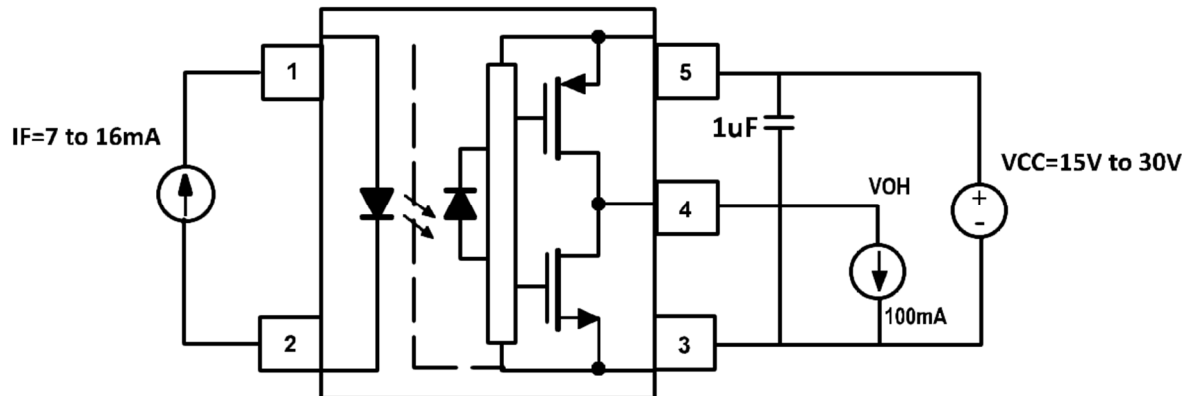


Fig.17 V_{OL} Test Circuit

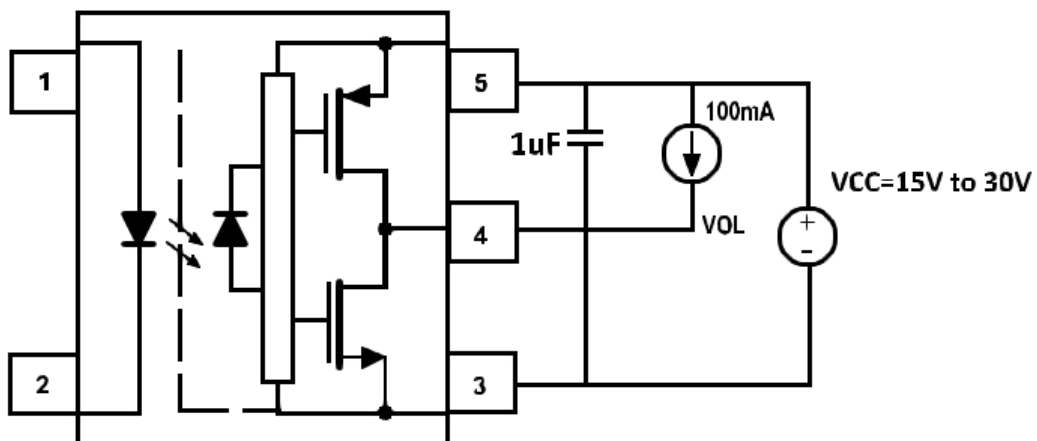


Fig.18 I_{FLH} Test Circuit

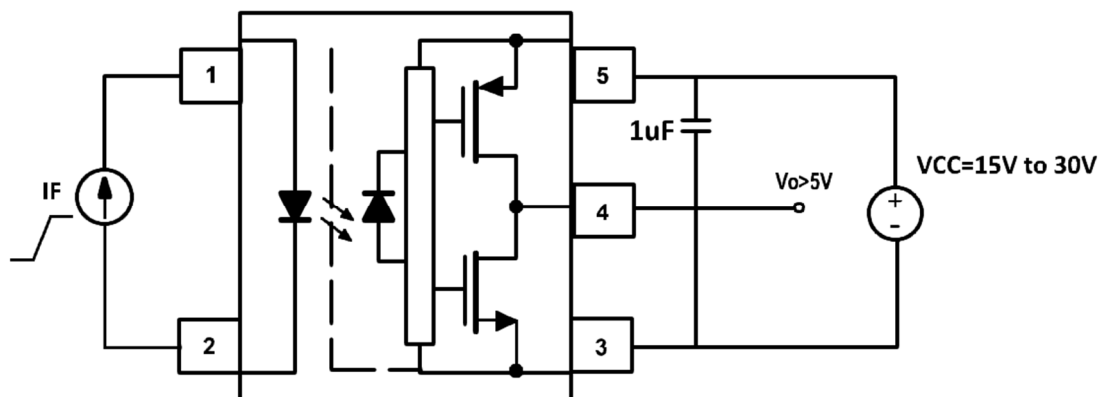


Fig.19 UVLO Test Circuit

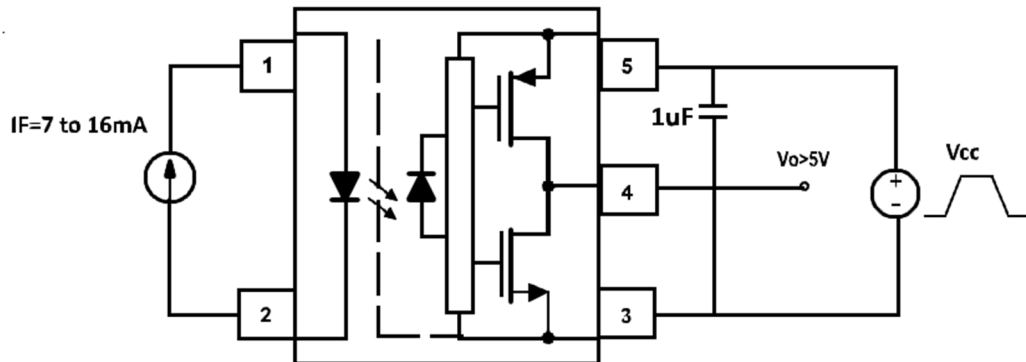


Fig.20 t_{PHL}, t_{PLH}, t_r and t_f Test Circuit and Waveforms

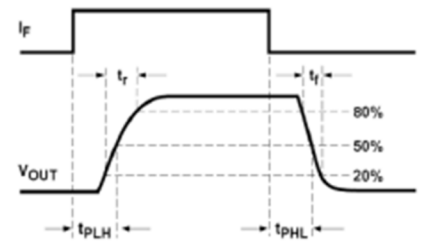
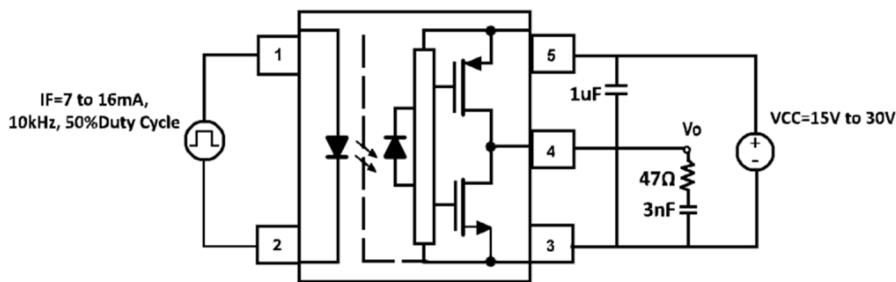
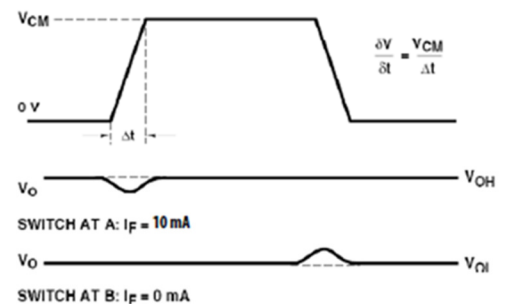
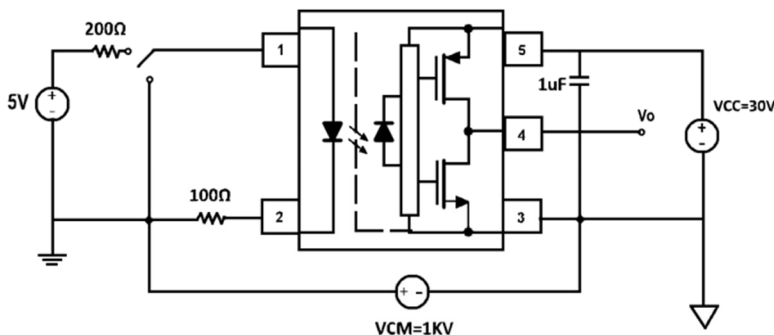


Fig.21 CMR Test Circuit with Split Resistors Network and Waveforms

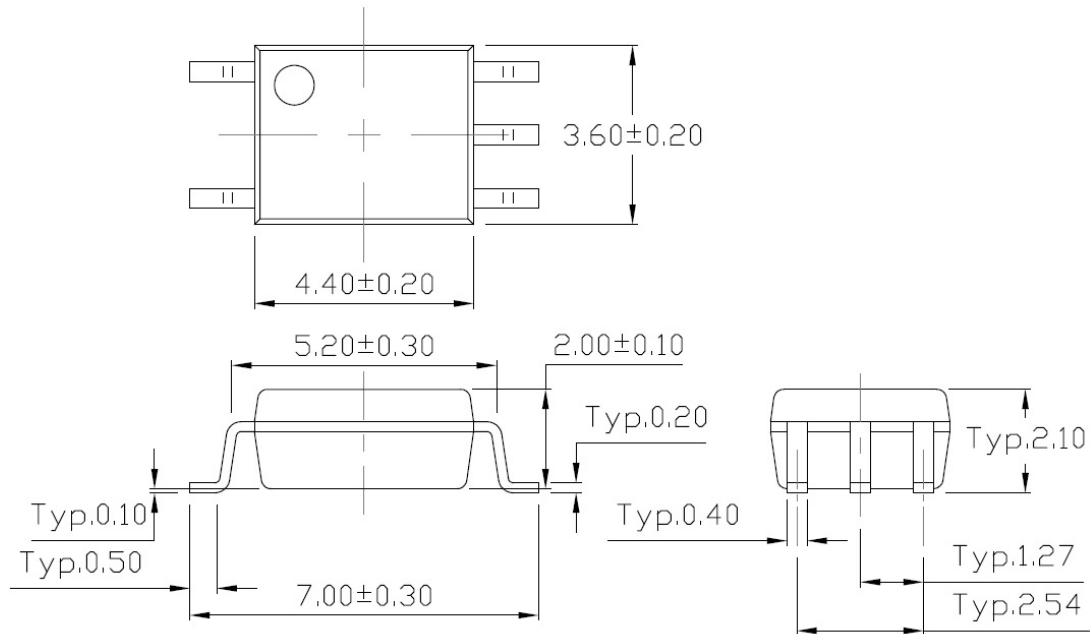




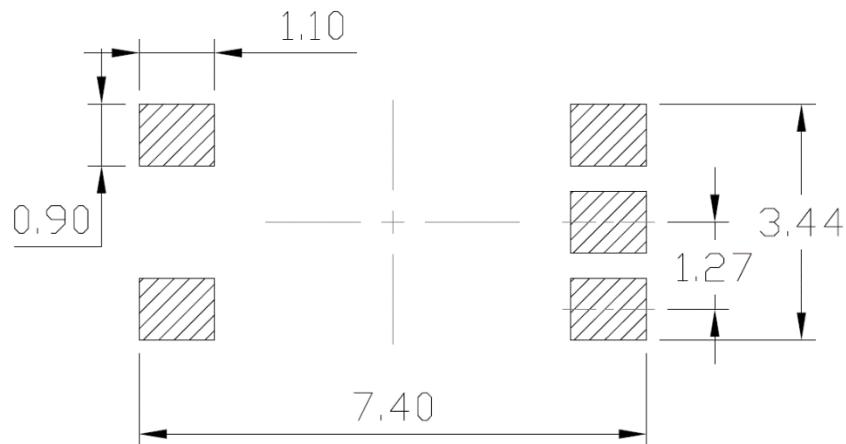
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PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)



RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)



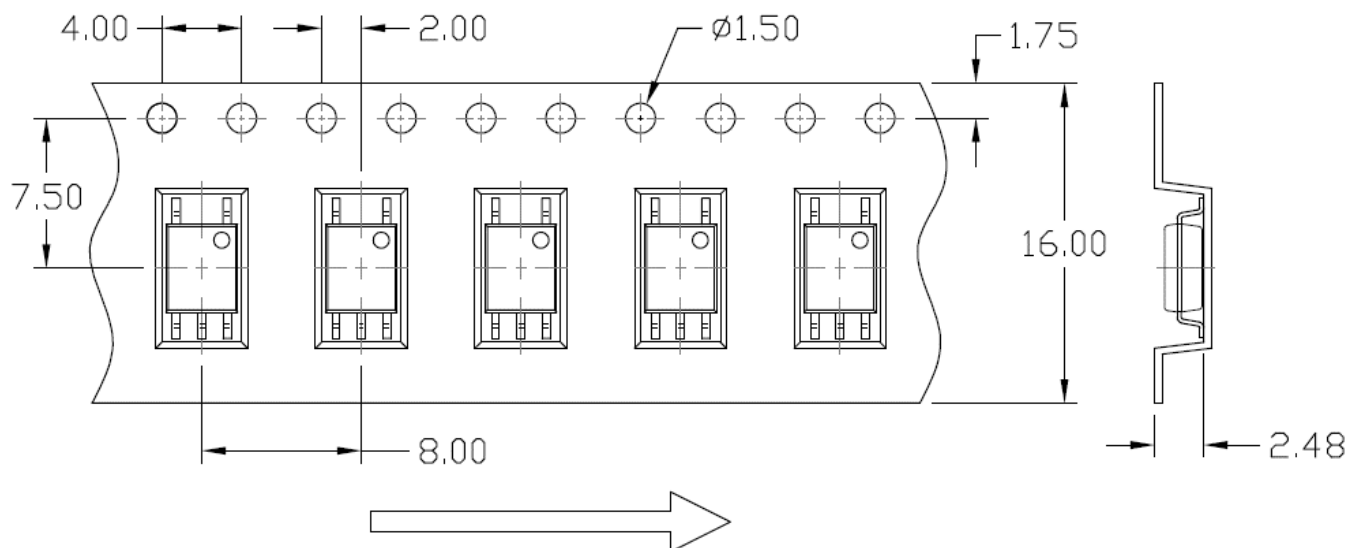


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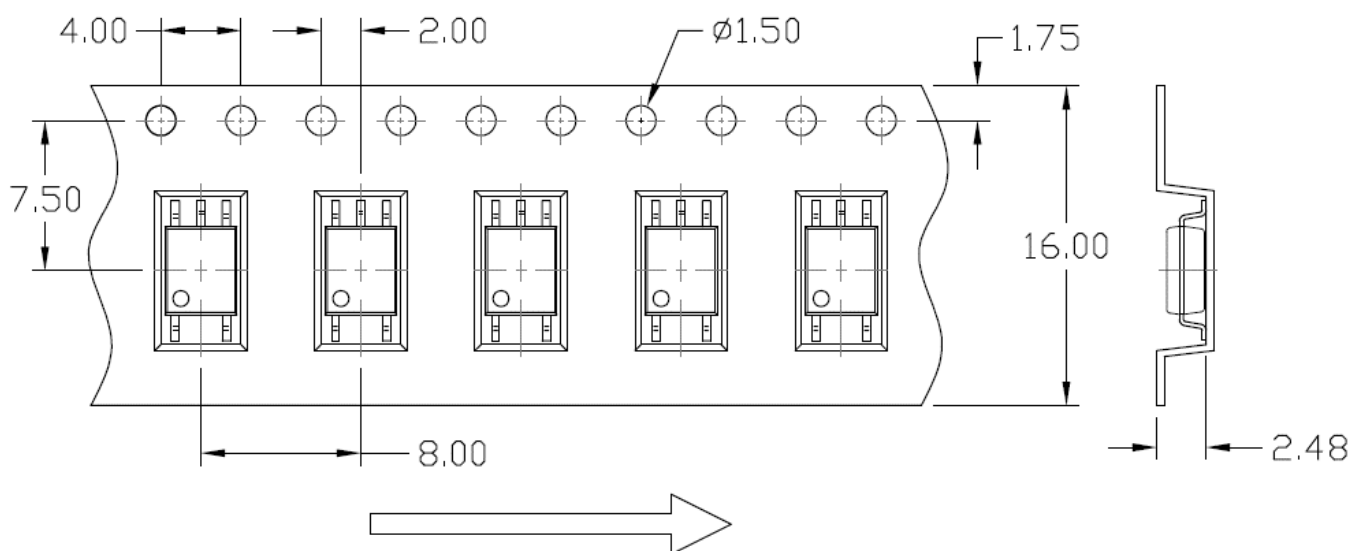
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CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option T1



Option T2

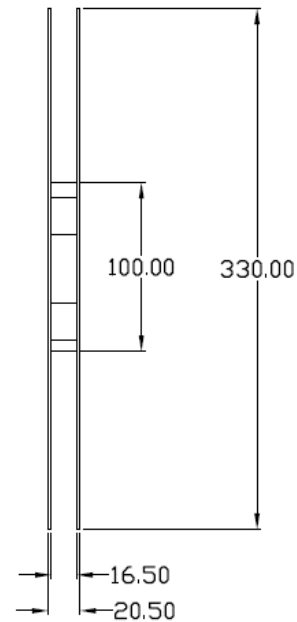
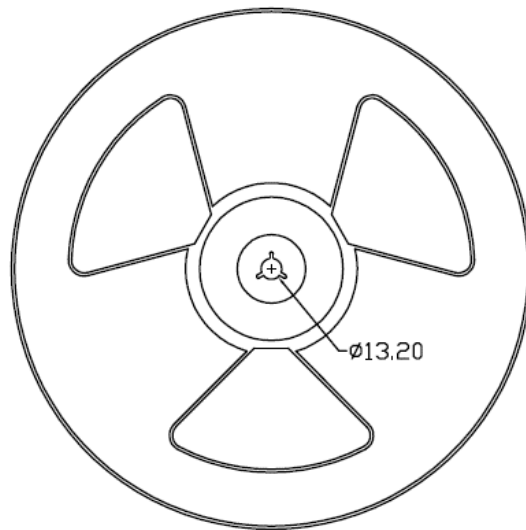




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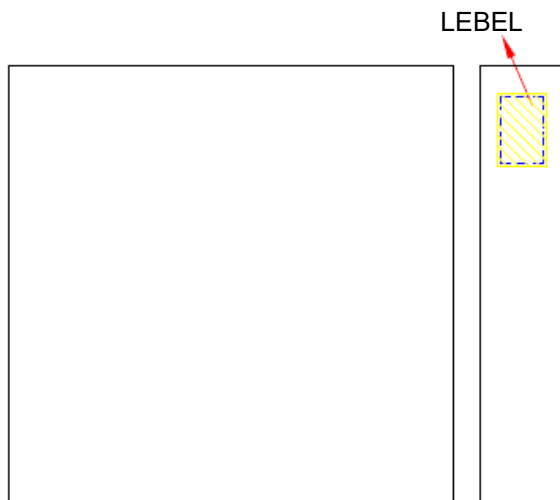
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REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)



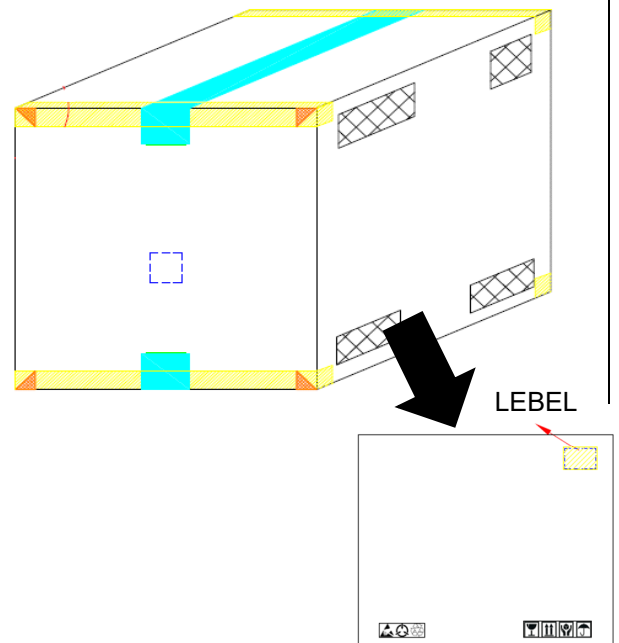
BOX SPECIFICATIONS (Reel Type)

INNER BOX



L x W x H = 36cm x 36cm x 6.9cm

OUTER BOX



L x W x H = 45cm x 38cm x 38cm



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ORDERING AND MARKING INFORMATION

MARKING INFORMATION



M : Company Abbr.
YY : Year date code
WW : 2-digit work week
155E : Part Number
T : Factory identification mark
V : VDE Identification(Optional)

ORDERING INFORMATION

MPCS-155E(Z)-GV

MPC – Company Abbr.
S – Stack
155E – Part Number
Z – Tape and Reel Option (T1/T2)
G – Green Part
V – VDE Option (V or None)

LABEL INFORMATION



喆光照明光電股份有限公司

WISELITE Optronics Co., Ltd

Part No : XXXXXXXXXXXXX

Bin Code : X



Lot No : XXXXXXXXXXXX

Date Code : XXXX

Q'ty : XXXX pcs



PACKING QUANTITY

Option	Quantity	Quantity – Inner box	Quantity – Outer box
T1	3000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 45k Units
T2	3000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box = 45k Units

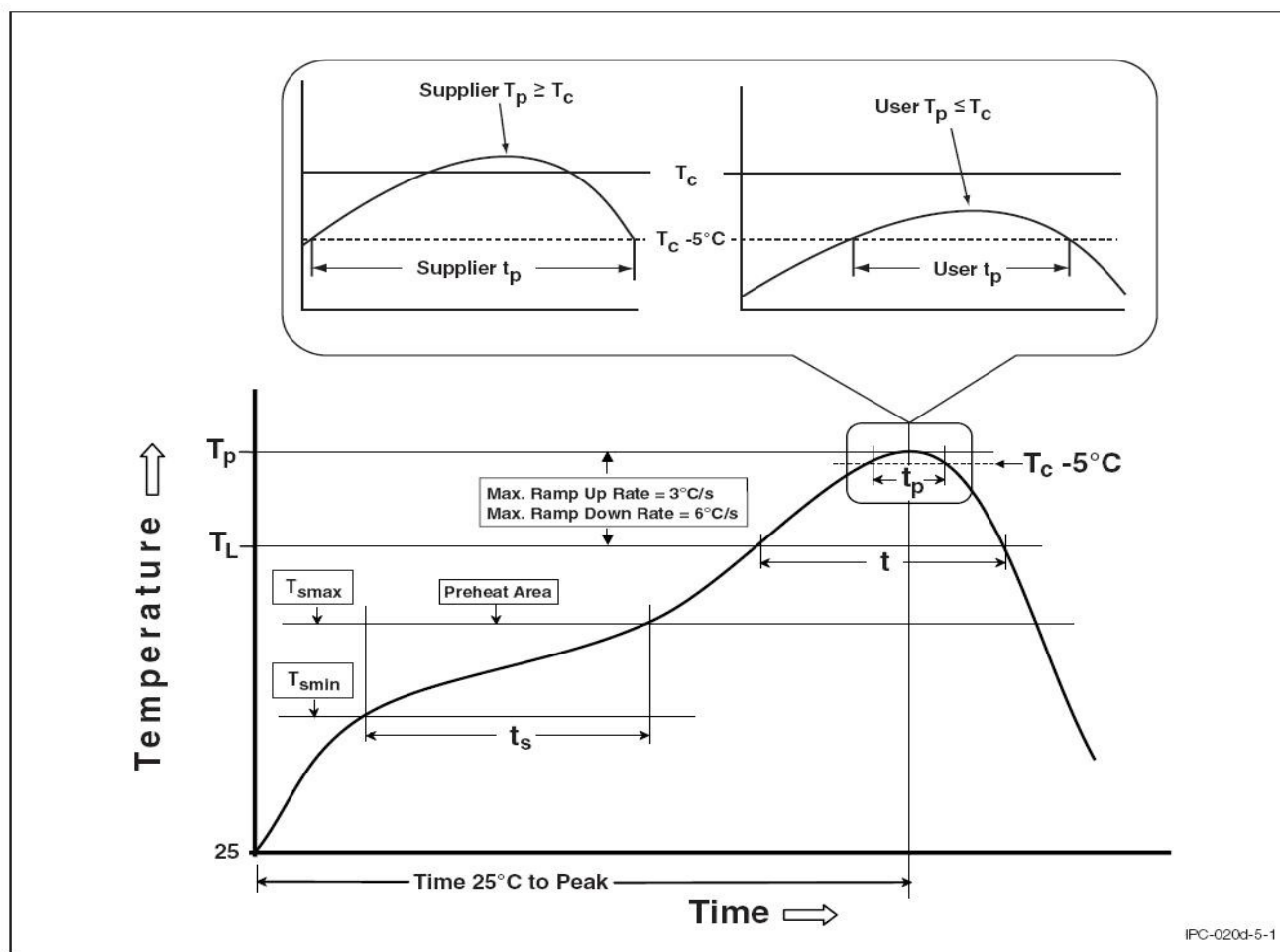


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REFLOW INFORMATION

REFLOW PROFILE



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°C/second max.	3°C/second max.
Liquidous 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°C +0°C / -5°C	260°C +0°C / -5°C
Time (t _P) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (T _P to T _L)	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

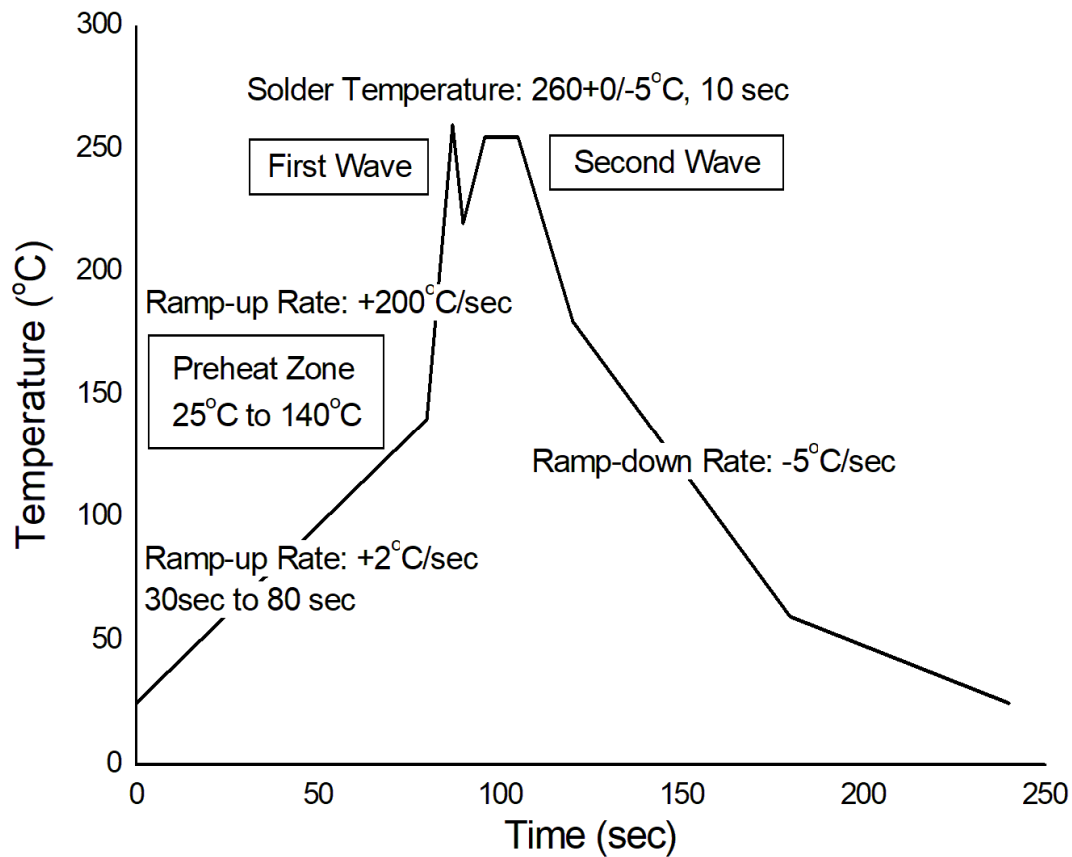


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TEMPERATURE PROFILE OF SOLDERING

WAVE SOLDERING (JESD22-A111 COMPLIANT)



HAND SOLDERING BY SOLDERING IRON

Soldering Temperature	380+0/-5°C
Soldering Time	3 sec max.

One time soldering is recommended for all soldering method.

Do not solder more than three times for IR reflow soldering.



DISCLAIMER

- WISELITE is continually improving the quality, reliability, function and design. WISELITE reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
- WISELITE makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, WISELITE disclaims (a) any and all liability arising out of the application or use of any product, (b) any and all liability, including without limitation special, consequential or incidental damages, and (c) any and all implied warranties, including warranties of fitness for particular.
- The products shown in this publication are designed for the general use in electronic applications such as office automation, equipment, communications devices, audio/visual equipment, electrical application and instrumentation purpose, non-infringement and merchantability.
- This product is not intended to be used for military, aircraft, medical, life sustaining or lifesaving applications or any other application which can result in human injury or death.
- Please contact WISELITE sales agent for special application request.
- Immerge unit's body in solder paste is not recommended.
- Parameters provided in datasheets may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated in each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify WISELITE's terms and conditions of purchase, including but not limited to the warranty expressed therein.
- Discoloration might be occurred on the package surface after soldering, reflow or long-time use. It neither impacts the performance nor reliability.