



MPCS-M480 Series

SOP5, DC Input, IPM Photo coupler

Description

The MPCS-M480 series fast speed photocoupler contains a LED and photo detector in a plastic SOP5 package with built-in Schmitt trigger to provide logic-compatible waveforms, eliminating the need for additional wave shaping. The totem pole output eliminates the need for a pull up resistor and allows for direct drive Intelligent Power Module or gate drive. Minimized propagation delay difference between devices makes these optocouplers excellent solutions for improving inverter efficiency through reduced switching dead time.

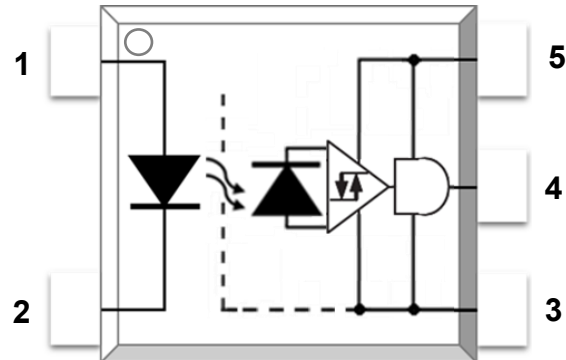
Features

- High isolation 3750 VRMS
- MSL class 1
- Guaranteed performance over temperature -40°C ~ +110°C.
- Totem pole output
- Truth Table Guaranteed: V_{CC} from 4.5V to 30V
- Short Maximum Propagation Delays
- Minimized Pulse Width Distortion (PWD)
- Very High Common Mode Rejection (CMR)

Applications

- IPM Interface Isolation
- Isolated IGBT/MOSFET Gate Drive
- AC and Brushless DC Motor Drives
- Industrial Inverters
- General Digital Isolation

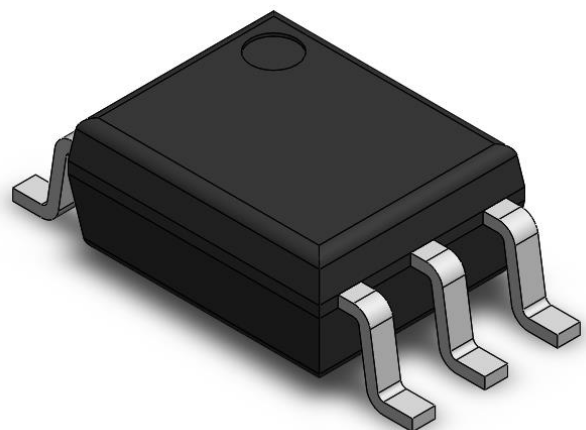
SCHEMATIC



PIN DEFINITION

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

PACKAGE OUTLINE





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TRUTH TABLE

LED	OUT
ON	H
OFF	L

Note: A 0.1 μ F bypass capacitor must be connected between Pin 3 and 5.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	NOTE
Storage Temperature	T _{stg}	-55	125	°C	-
Operating Temperature	T _{opr}	-40	110	°C	-
Output IC Junction Temperature	T _J	-	125	°C	-
Average Forward Input Current	I _F	-	20	mA	-
Reverse Input Voltage	V _R	-	5	V	-
Output Collector Current	I _O	-	50	mA	-
Supply Voltage	V _{CC}	0	35	V	-
Output Collector Voltage	V _O	-0.5	35	V	-
Total Package Power Dissipation	P _T	-	145	mW	-
Lead Solder Temperature	T _{sol}	-	260	°C	-

Note: A ceramic capacitor (0.1 μ F) should be connected between pin 5 and pin 3 to stabilize the operation of a high gain linear amplifier. Otherwise, this Photocoupler may not switch properly. The bypass capacitor should be placed within 1 cm of each pin.

RECOMMENDED OPERATION CONDITIONS

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Operating Temperature	T _A	-40	110	°C
Supply Voltage ¹	V _{CC}	4.5	30	V
Input Current (ON) ²	I _{F(ON)}	1.6	5	mA
Input Voltage (OFF)	V _{F(OFF)}	-	0.8	V

Note 1: Detector requires a V_{CC} of 4.5 V or higher for stable operation as output might be unstable if V_{CC} is lower than 4.5 V. Be sure to check the power ON/OFF operation other than the supply current.

Note 2: The initial switching threshold is 1.6 mA or less. It is recommended that 2.2 mA be used to permit at least a 20% LED degradation guard band.



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ELECTRICAL OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
INPUT CHARACTERISTICS							
Forward Voltage	V_F	1.6	2.0	2.4	V	$I_F = 10\text{ mA}$	-
Input Reverse Voltage	BV_R	5	-	-	V	$I_R = 10\mu\text{A}$	-
Input Threshold Current (Low to High)	I_{FLH}	-	0.75	1.5	mAM	$V_{CC} = 30\text{ V}, V_O > 5\text{ V}$	-
Input Capacitance	C_{IN}	-	60	-	pF	$V_F = 0\text{ V}, f = 1\text{ MHz}$	1
OUTPUT CHARACTERISTICS							
High Level Supply Current	I_{CCH}	-	-	3.0	mA	$V_{CC} = 5.5\text{ V}, I_F = 5\text{ mA}, I_O = 0\text{ mA}$	-
		-	1.8	3.0	mA	$V_{CC} = 30\text{ V}, I_F = 5\text{ mA}, I_O = 0\text{ mA}$	-
Low Level Supply Current	I_{CCL}	-	-	3.0	mA	$V_{CC} = 5.5\text{ V}, V_F = 0\text{ V}, I_O = 0\text{ mA}$	-
		-	1.8	3.0	mA	$V_{CC} = 30\text{ V}, V_F = 0\text{ V}, I_O = 0\text{ mA}$	-
Logic High Short Circuit Output Current	I_{OSH}	-	-	-100	mA	$V_{CC} = 5.5\text{ V}, I_F = 5\text{ mA}, V_O = \text{GND}$	2
		-	-	-200		$V_{CC} = 20\text{ V}, I_F = 5\text{ mA}, V_O = \text{GND}$	
Logic Low Short Circuit Output Current	I_{OSL}	100	-	-	mA	$V_O = V_{CC} = 5.5\text{ V}, V_F = 0\text{ V}$	2
		200	-	-		$V_O = V_{CC} = 20\text{ V}, V_F = 0\text{ V}$	
High Level Output Voltage	V_{OH}	V_{CC} -0.5	V_{CC} -0.07	-	V	$I_{OL} = -6.5\text{ mA}$	-
Low Level Output Voltage	V_{OL}	-	0.08	0.5	V	$I_{OL} = 6.5\text{ mA}$	-

Note: Specified over recommended temperature ($T_A = -40^\circ\text{C}$ to $+110^\circ\text{C}$, $+4.5\text{ V} \leq V_{CC} \leq 30\text{ V}$), $I_{F(ON)} = 1.6\text{ mA}$ to 5 mA , $V_{F(OFF)} = 0\text{ V}$ to 0.8 V , unless otherwise specified. All typicals at $T_A = 25^\circ\text{C}$.

Note 1 Input capacitance is measured between pin 1 and pin 2.

Note 2: Duration of output short circuit time should not exceed $500\text{ }\mu\text{s}$.



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SWITCHING SPECIFICATION

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION	NOTE
SWITCHING CHARACTERISTICS							
Propagation Delay Time to Output Low Level	t_{PHL}	-	65	110	ns	$f = 10\text{kHz}$, Duty Cycle = 50% $I_F = 2\text{mA}$, $V_{CC} = 30\text{V}$	1
Propagation Delay Time to Output High Level	t_{PLH}	-	45	110	ns		1
Pulse Width Distortion	P_{WD}	-	20	100	ns		2
Propagation Delay Difference Between Any Two Parts	P_{DD} ($t_{PHL} - t_{PLH}$)	-100	-	100	ns		3
Rise Time	t_r	-	4	-	ns		-
Fall Time	t_f	-	4	-	ns		-
Common Mode Transient Immunity at Logic High	CM_H	20	-	-	kV/ μs	$I_F = 4.0\text{mA}$ $V_{CC} = 5\text{V}$, $T_A = 25^\circ\text{C}$, $V_{CM} = 1.5\text{kV}$	4
Common Mode Transient Immunity at Logic Low	CM_L	20	-	-	kV/ μs	$I_F = 0\text{mA}$ $V_{CC} = 5\text{V}$, $T_A = 25^\circ\text{C}$, $V_{CM} = 1.5\text{kV}$	4

Note: Over recommended operating conditions $T_A = -40^\circ\text{C}$ to 105°C , $V_{CC} = +4.5\text{V}$ to 30V , $I_{F(ON)} = 1.6\text{mA}$ to 5mA , $V_{F(OFF)} = 0\text{V}$ to 0.8V , unless otherwise specified. All typicals at $T_A = 25^\circ\text{C}$.

Note 1: The t_{PLH} propagation delay is measured from the 50% point on the leading edge of the input pulse to the 1.3 V point on the leading edge of the output pulse. The t_{PHL} propagation delay is measured from the 50% point on the trailing edge of the input pulse to the 1.3 V point on the trailing edge of the output pulse.

Note 2: Pulse Width Distortion (PWD) is defined as $|t_{PHL} - t_{PLH}|$ for any given device.

Note 3: The difference of t_{PLH} and t_{PHL} between any two devices under the same test condition.

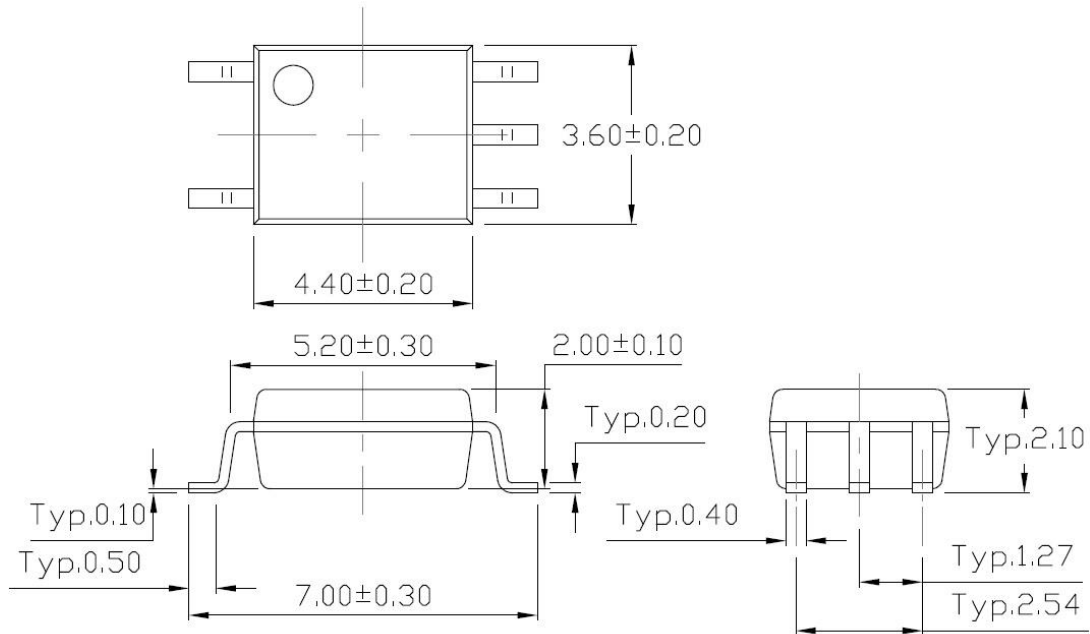
Note 4: CM_H is the maximum slew rate of the common mode voltage that can be sustained with the output voltage in the logic high state, $V_O > 2.0\text{V}$. CM_L is the maximum slew rate of the common mode voltage that can be sustained with the output voltage in the logic low state, $V_O < 0.8\text{V}$. Note: Equal value split resistors ($R_{in}/2$) must be used at both ends of the LED.



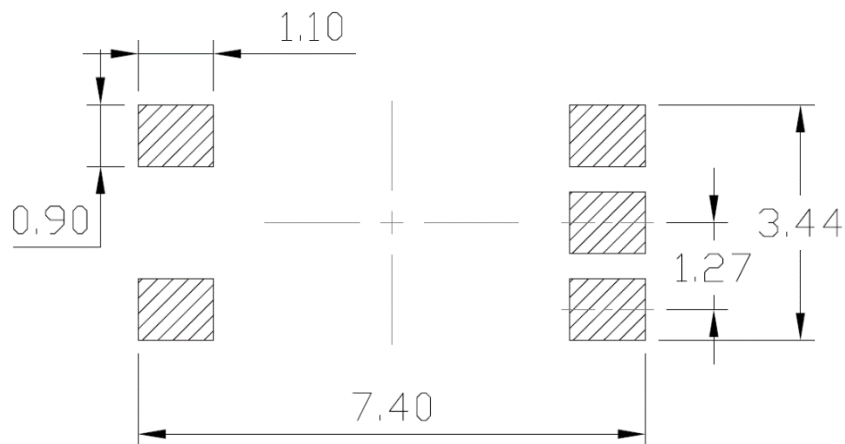
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PACKAGE DIMENSIONS (Dimensions in mm unless otherwise stated)



RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)



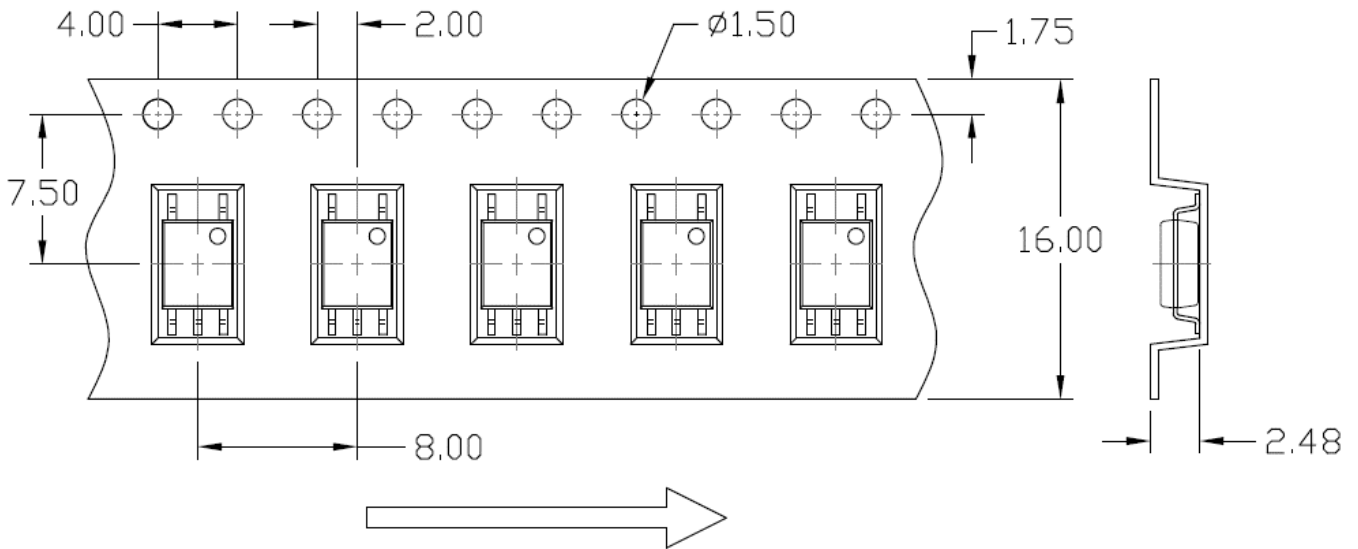


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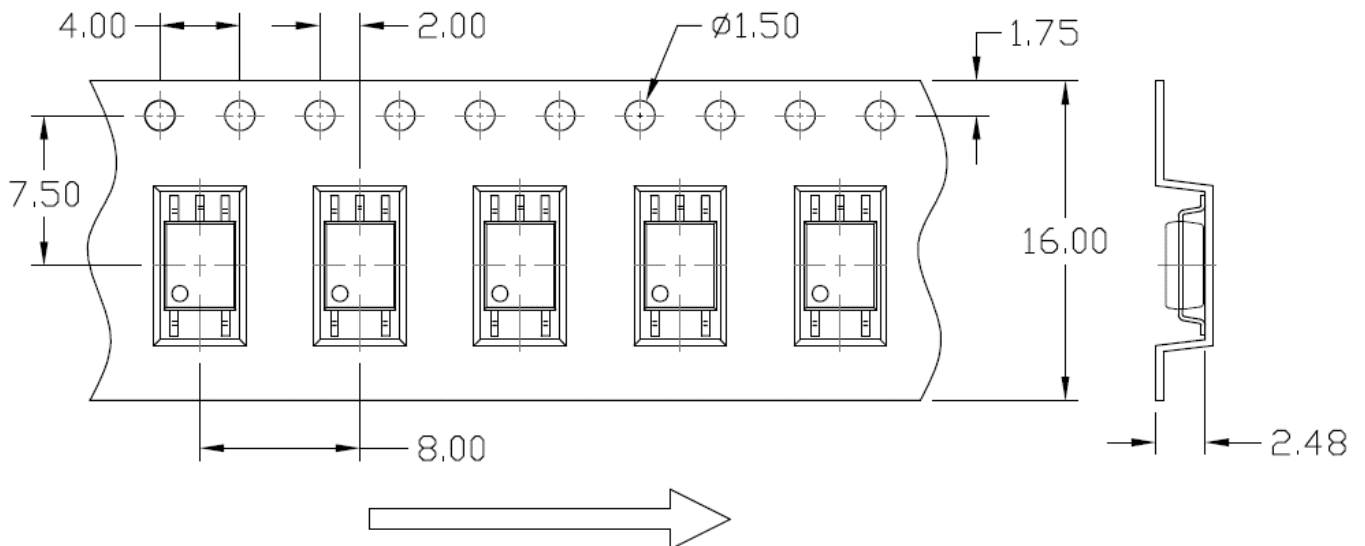
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CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option T1



Option T2

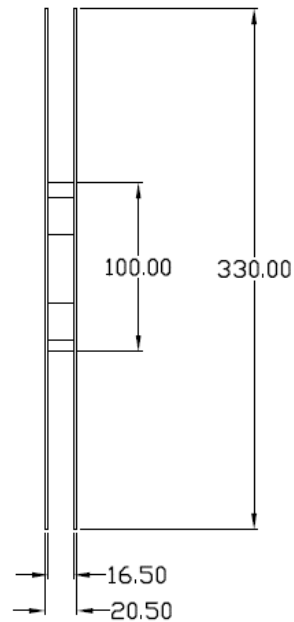
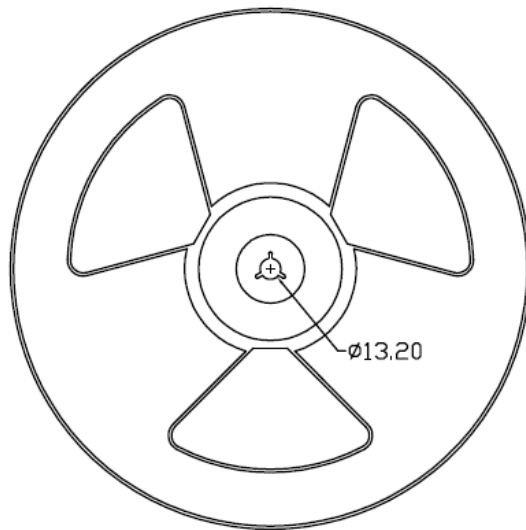




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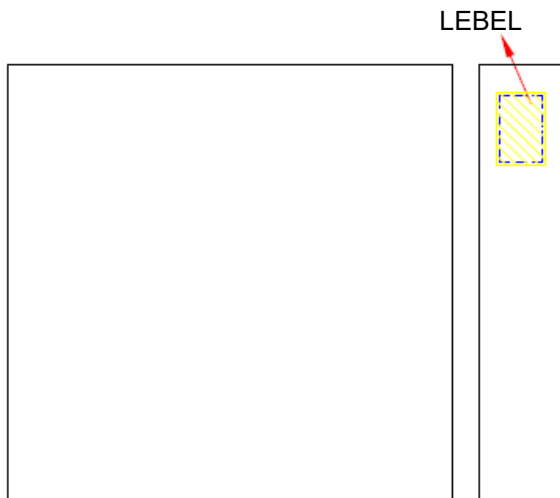
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REEL SPECIFICATIONS (Dimensions in mm unless otherwise stated)



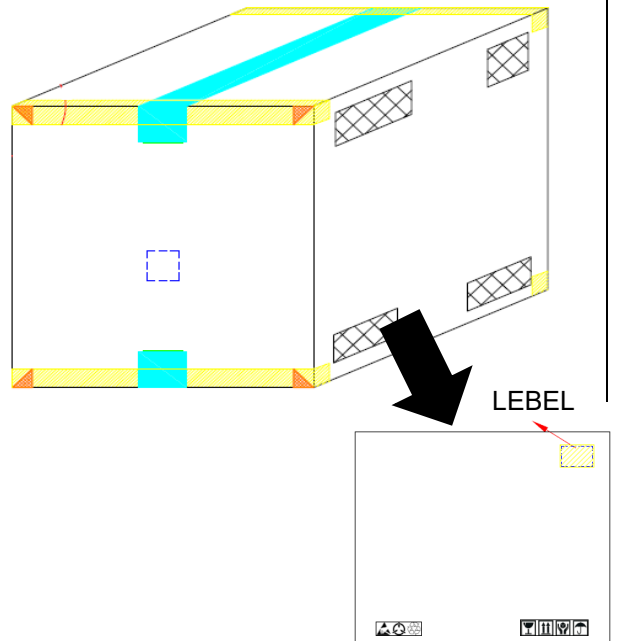
BOX SPECIFICATIONS (Reel Type)

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
M480 : Part Number
T : Factory identification mark
V :VDE Identification(Optional)

ORDERING INFORMATION

MPCS-M480(Z)-GV

MPC – Company Abbr.
S – Stack
M480 – 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

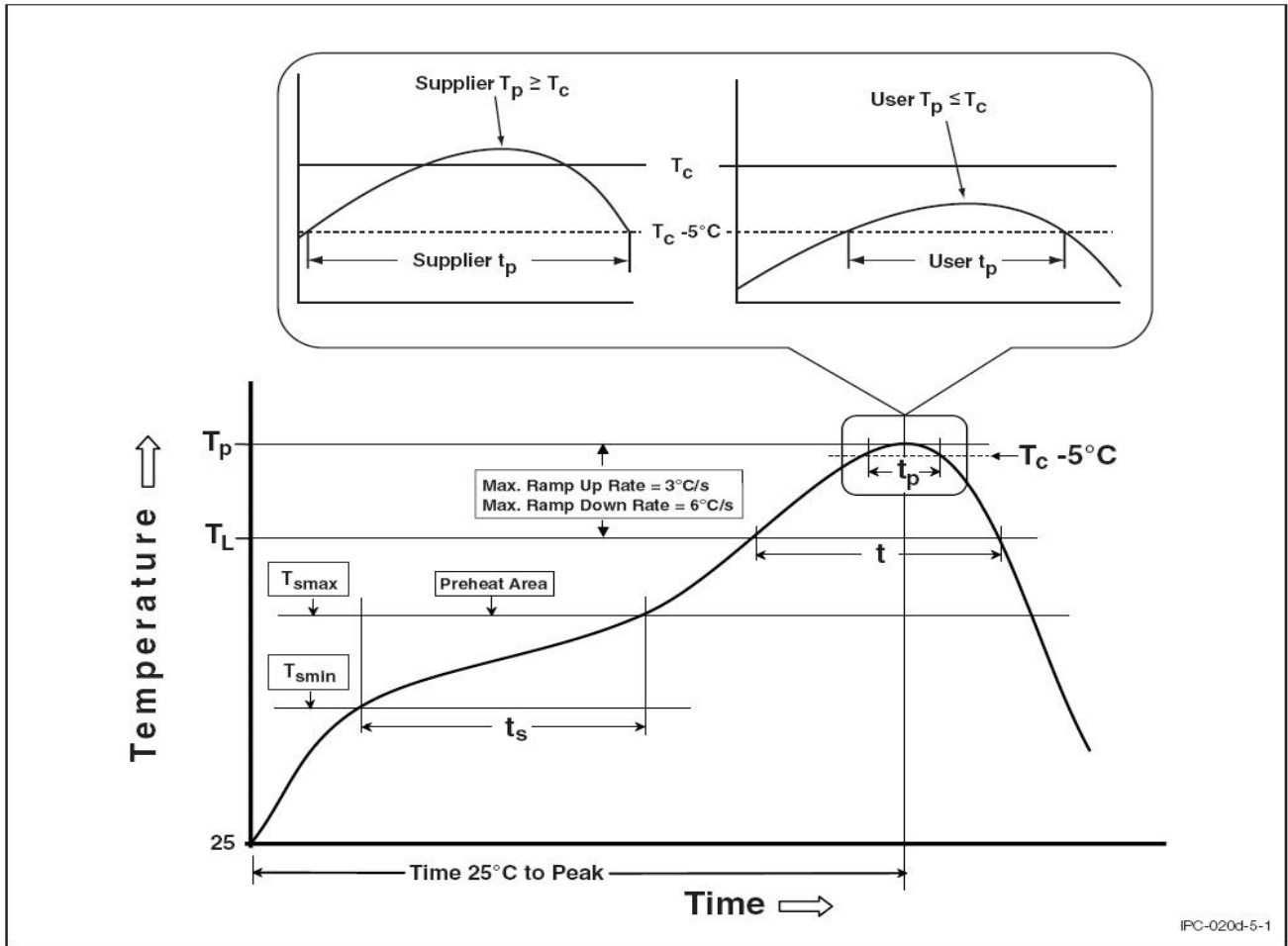


PACKING QUANTITY

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

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.

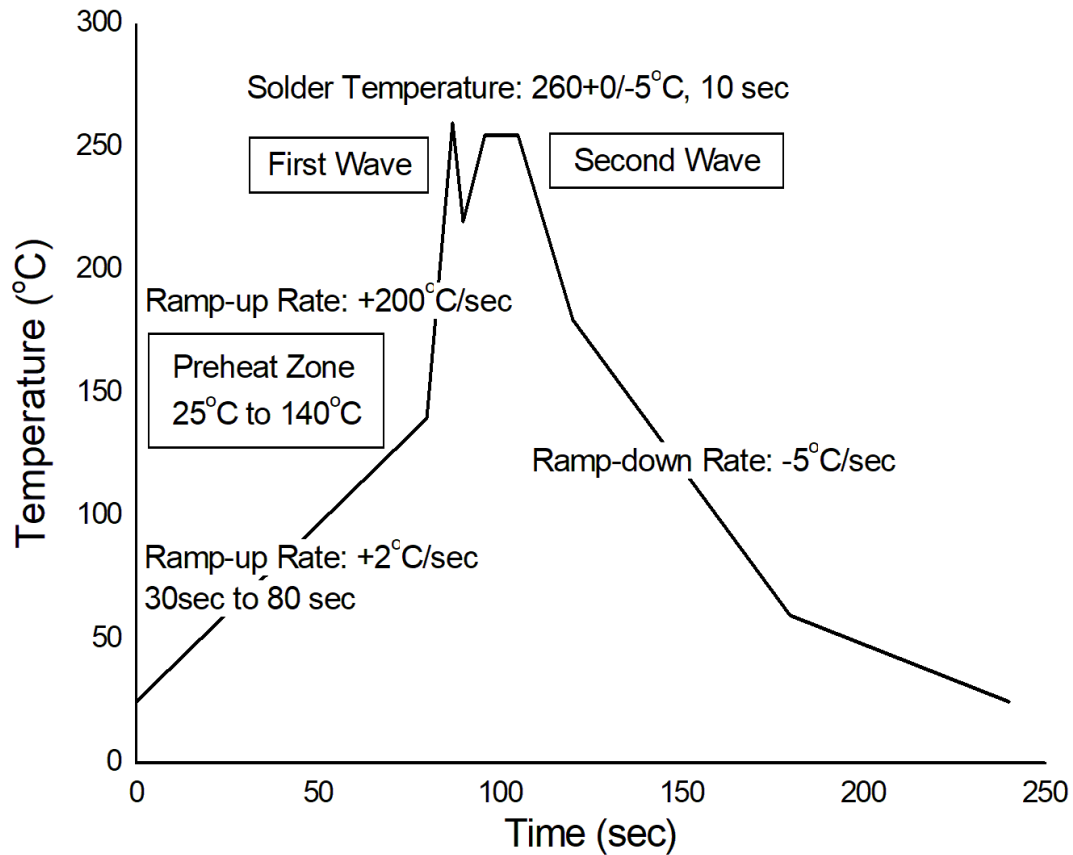


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TEMPERATURE PROFILE OF SOLDERING

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.
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- 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.