

Features

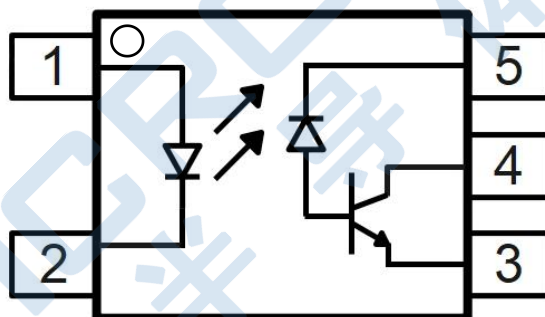
- High isolation 3750 VRMS
- DC input with high speed transistor
- Operating temperature range - 40 °C to 100 °C
- REACH compliance
- Halogen free
- MSL class 1
- Regulatory Approvals
 - UL - UL1577
 - VDE - EN60747-5-5(VDE0884-5)
 - CQC - GB4943.1

Applications

- Line receivers
- Telecommunication equipment
- Out interface to CMOS-LSTTL-TTL
- Wide bandwidth analog coupling
- Pulse transformer replacement
- Computer-peripheral interface

Description

The ICPL-M453 series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon high speed photo transistor in a plastic SOP5 package. With the robust coplanar double mold structure, ICPL-M453 series provide the most stable isolation feature.



Truth Table

Input	Output
H	L
L	H



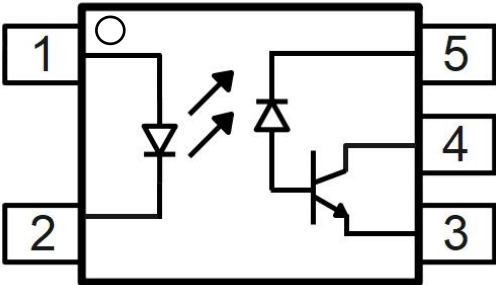
ORDERING INFORMATION

Outline	Part Number	Package	Marking	Packing	Packing Size	Quantity
	ICPL-M453-510E	SOP5	ICPL M453 /YYWW A	Reel	13 "	3000

CONTENTS

Pin Configuration And Functions.	3
Absolute Maximum Ratings.	3
Electrical Optical Characteristics.	4
Switching Characteristics.	5
Characteristic Curves.	6
Test Circuits.	8
Mechanical Dimensions.	10
Recommended Solder Mask.	10
Carrier Tape Specifications.	11
Ordering And Marking Information.	12
Reflow Information.	13
Temperature Profile Of Soldering.	14
Disclaimer.	15

PIN CONFIGURATION AND FUNCTIONS

	Pin	Name
	1	Anode
	2	Cathode
	3	GND
	4	V _O
	5	V _{CC}

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit	Note
INPUT				
Forward Current	I _F	25	mA	
Peak Forward Current	I _{FP}	50	mA	1
Peak Transient Current	I _{F(trans)}	1	A	2
Reverse Voltage	V _R	5	V	
Input Power Dissipation	P _I	100	mW	
OUTPUT				
Supply Voltage	V _{CC}	-0.5~30	V	
Output Voltage	V _O	-0.5~20	V	
Output Current	I _O	50	mA	
Output Power Dissipation	P _O	100	mW	
COMMON				
Total Power Dissipation	P _{tot}	200	mW	
Isolation Voltage	V _{iso}	3750	V _{RMS}	3
Operating Temperature	T _{opr}	-40~100	°C	
Storage Temperature	T _{stg}	-55~125	°C	
Soldering Temperature	T _{sol}	260	°C	4

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

Note 2. ≤1μs P.W,300pps

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

Note 4. For 10 seconds

ELECTRICAL OPTICAL CHARACTERISTICS at T_a=25°C

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition	Note
INPUT							
Forward Voltage	V _F	-	1.45	1.8	V	I _F =16mA	
Reverse Current	I _R	-	-	10	μA	V _R =5V	
Input Capacitance	C _{in}	-	60	-	pF	V=0, f=1MHz	
OUTPUT							
High Level Supply Current	I _{CCH}	-	0.01	1	μA	I _F =0mA, V _O =Open, V _{CC} =15V, T _a =25°C	
		-	-	2	μA	I _F =0mA, V _O =Open, V _{CC} =15V	
Low Level Supply Current	I _{CCL}	-	200	-	μA	I _F =16mA, V _O =Open, V _{CC} =15V	
Logic High Output Current	I _{OH}	-	0.001	0.5	μA	I _F =0mA, V _O =V _{CC} =5.5V, T _a =25°C	
		-	0.01	1	μA	I _F =0mA, V _O =V _{CC} =15V, T _a =25°C	
		-	-	50	μA	I _F =0mA, V _O =V _{CC} =15V	
TRANSFER CHARACTERISTICS(T _a =0 to 70°C , unless specified otherwise)							
Current Transfer Ratio	CTR	7	-	50	%	I _F = 16mA ,V _O = 0.4V, V _{CC} =4.5V, T _a =25°C	
Logic Low Output Voltage	V _{OL}	-	0.18	0.4	V	I _F = 16mA ,I _O = 1.1mA, V _{CC} =4.5V, T _a =25°C	
Isolation Resistance	R _{iso}	10^12	10^14	-	Ω	DC500V, 40 ~ 60% R.H.	
Floating Capacitance	C _{IO}	-	0.3	-	pF	V=0, f=1MHz	

SWITCHING CHARACTERISTICS
 ($T_a=0$ to 70°C , $I_F=16\text{mA}$, $V_{CC}=5\text{V}$, unless specified otherwise)

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition	Note
Propagation Delay Time to Logic Low	t_{PHL}	-	0.4	0.8	μs	$R_L=1.9\text{k}\Omega, T_a=25^{\circ}\text{C}$	Fig.13
		-	-	1.0		$R_L=1.9\text{k}\Omega$	
Propagation Delay Time to Logic High	t_{PLH}	-	0.35	0.8	μs	$R_L=1.9\text{k}\Omega, T_a=25^{\circ}\text{C}$	Fig.13
		-	-	1.0		$R_L=1.9\text{k}\Omega$	
Common Mode Transient Immunity at Logic High	CM_H	15	-	-	$\text{kV}/\mu\text{s}$	$I_F = 0\text{mA}$, $V_{CM}=1500\text{Vpp}$, $R_L=1.9\text{k}\Omega$, $T_a = 25^{\circ}\text{C}$	Fig.15
Common Mode Transient Immunity at Logic Low	CM_L	15	-	-	$\text{kV}/\mu\text{s}$	$I_F = 16\text{mA}$, $V_{CM}=1500\text{Vpp}$, $R_L=1.9\text{k}\Omega$, $T_a = 25^{\circ}\text{C}$	Fig.15

CHARACTERISTIC CURVES

Fig.1 Forward Current vs. Forward Voltage

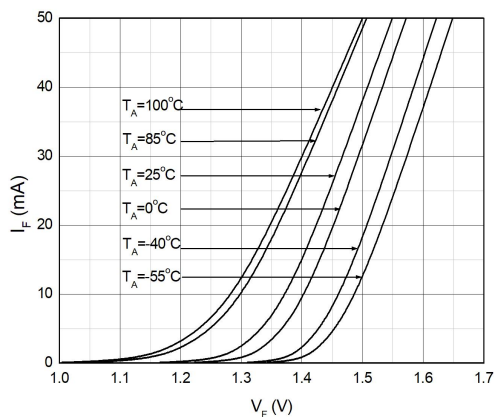


Fig.2 Forward Voltage vs. Ambient Temperature

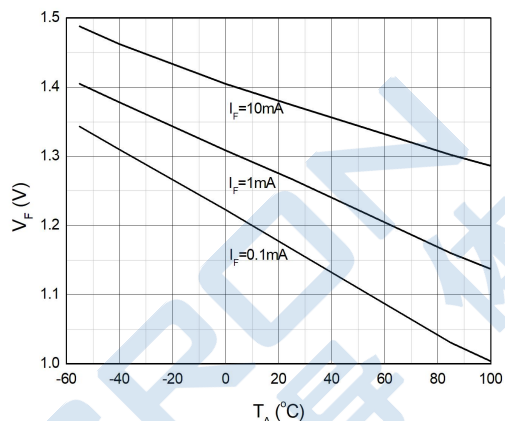


Fig.3 Input Threshold Current vs. Ambient Temperature

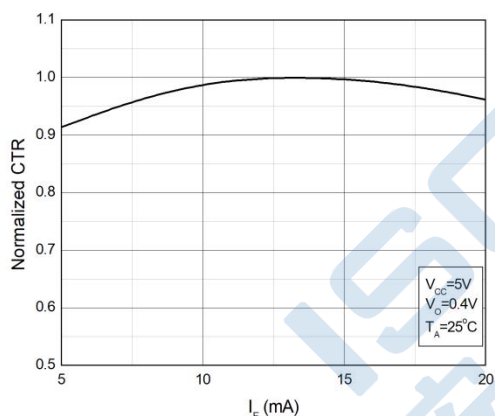


Fig.4 Input Threshold Current vs. Ambient Temperature

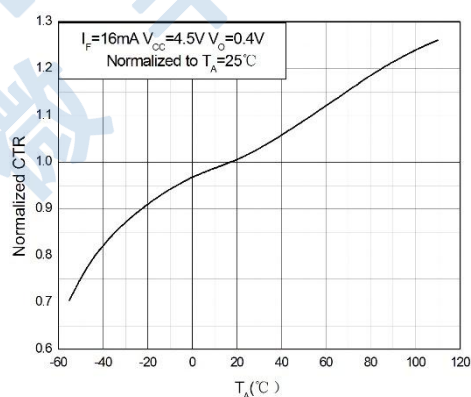


Fig.5 Low Level Output Current vs. Ambient Temperature

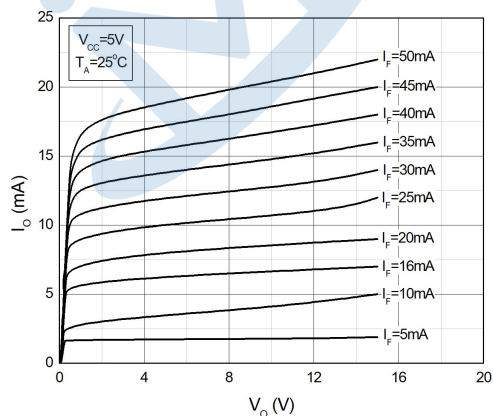


Fig.6 Low Level Output Current vs. Ambient Temperature

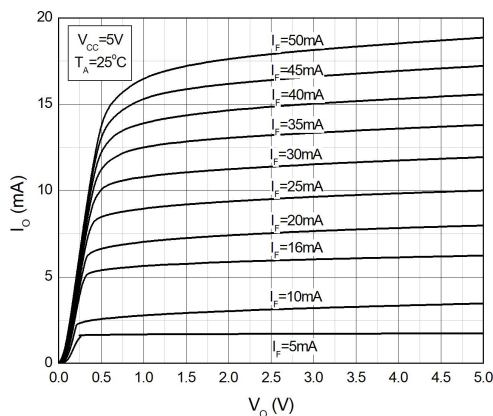


Fig.7 Low Level Output Voltage vs. Ambient Temperature

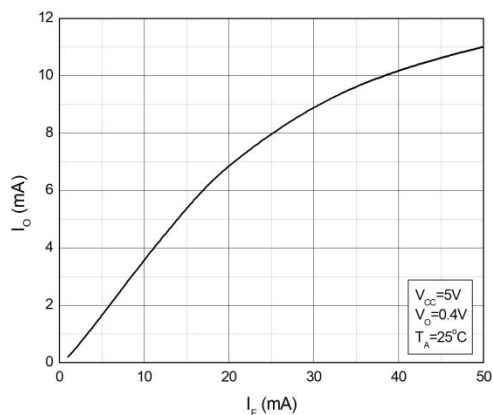


Fig.8 Low Level Output Voltage vs. Ambient Temperature

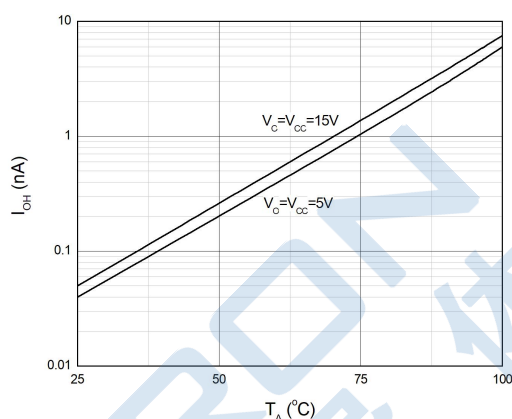


Fig.9 High Level Output Current vs. Ambient Temperature

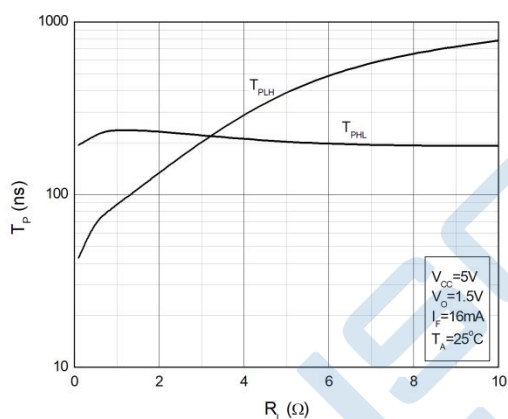


Fig.10 High Level Output Current vs. Ambient Temperature

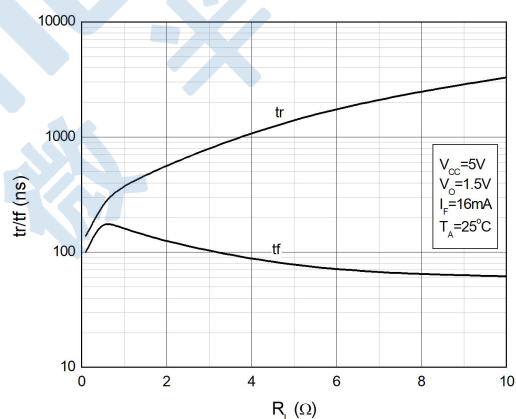


Fig.11 Output Voltage vs. Forward Current

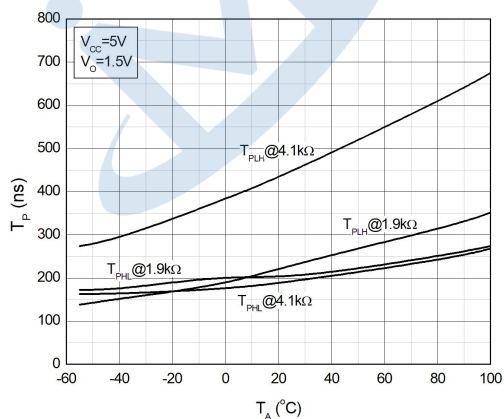
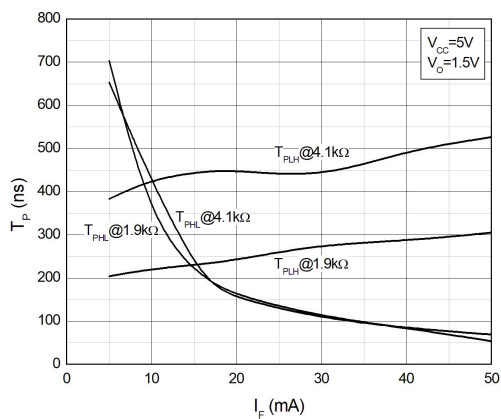


Fig.12 Output Voltage vs. Forward Current



TEST CIRCUITS

Fig.13 Test Circuits for t_{PHL} , t_{PLH} , t_r , t_f

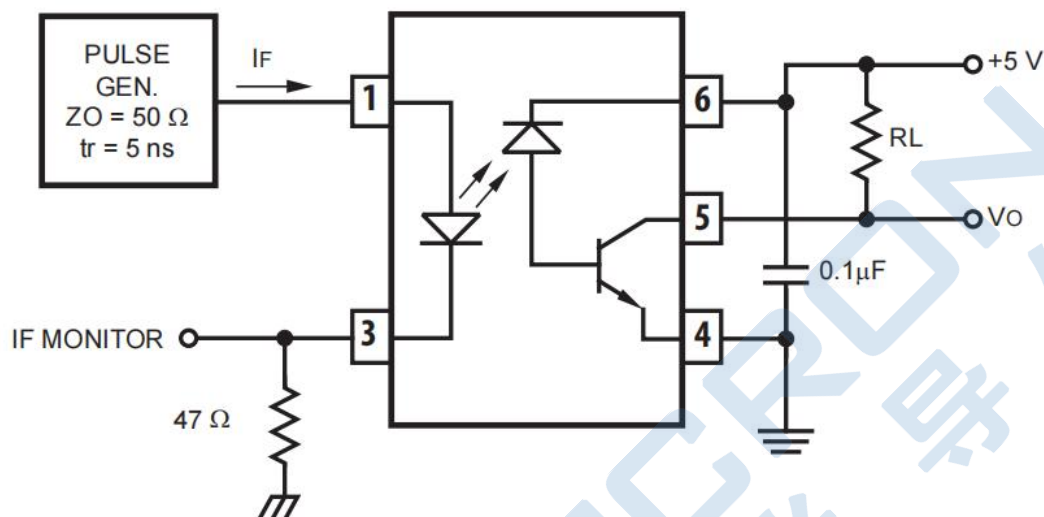
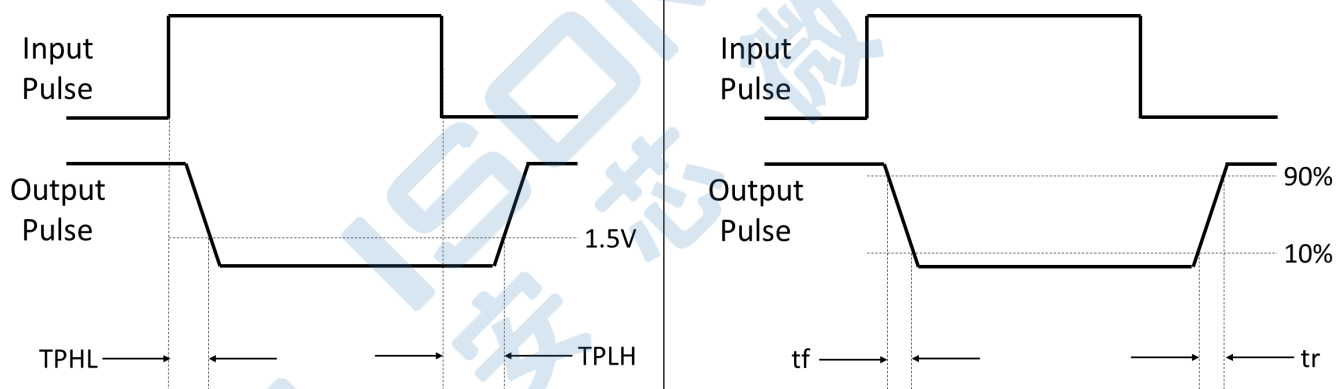


Fig.14 Waveforms of t_{PHL} , t_{PLH} , t_r , t_f



TEST CIRCUITS

Fig.15 Test Circuits for Common Mode Transient Immunity

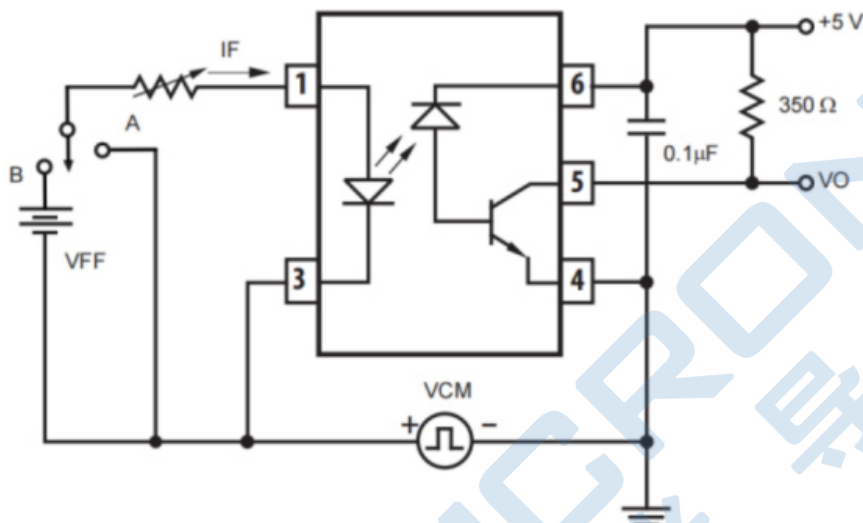
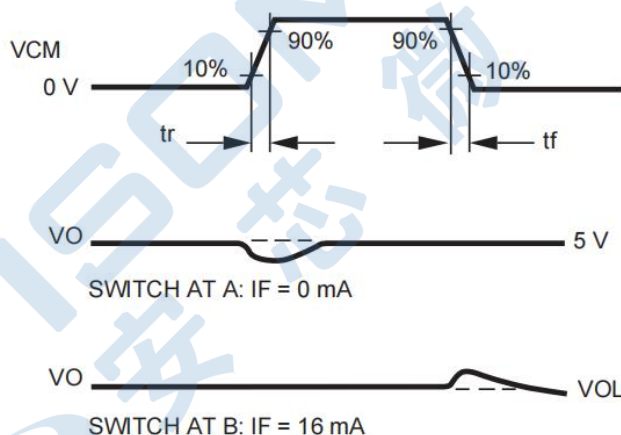
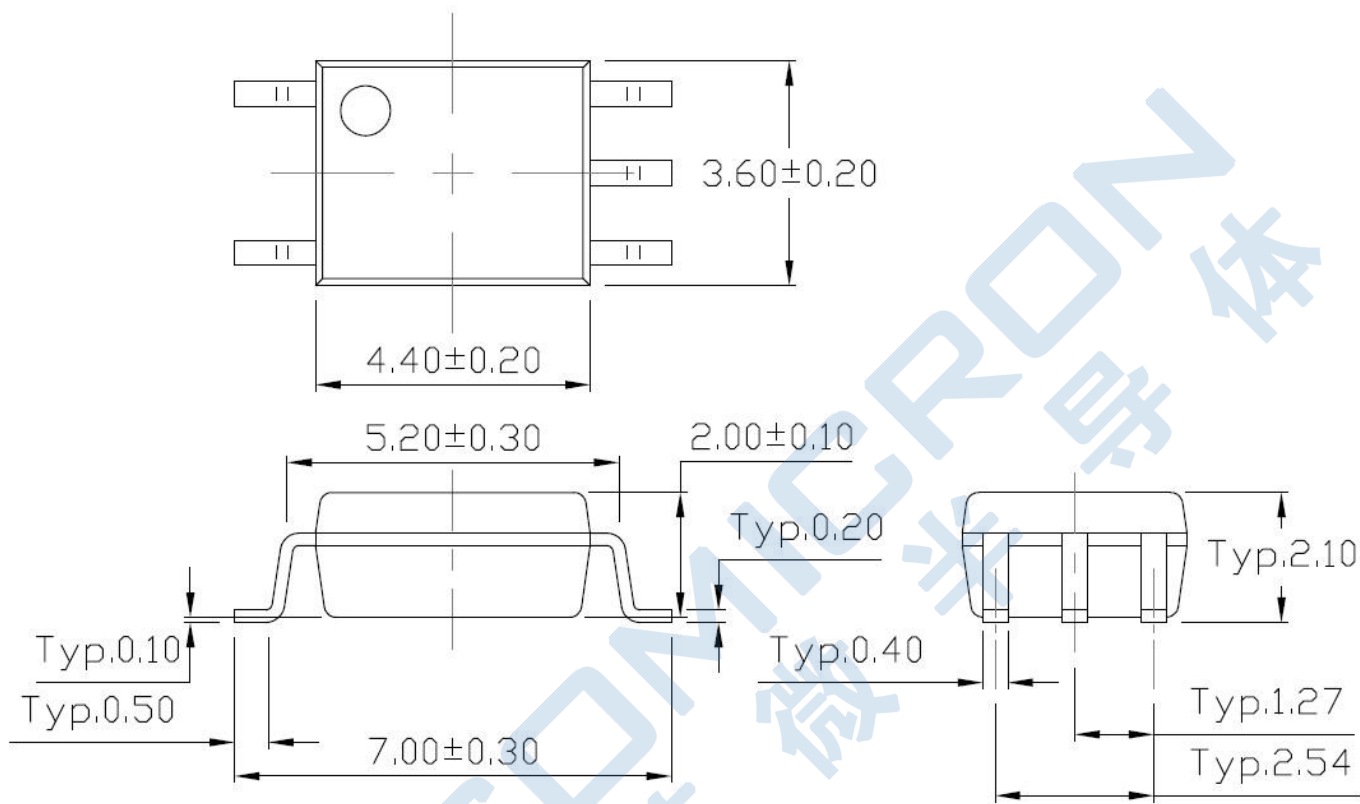


Fig.16 Waveforms of Common Mode Transient Immunity

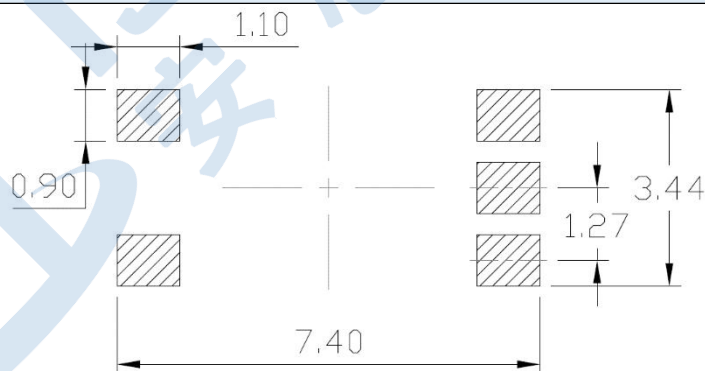


MECHANICAL DIMENSIONS

Surface Mount (Low Profile) - (SOP5-SL)



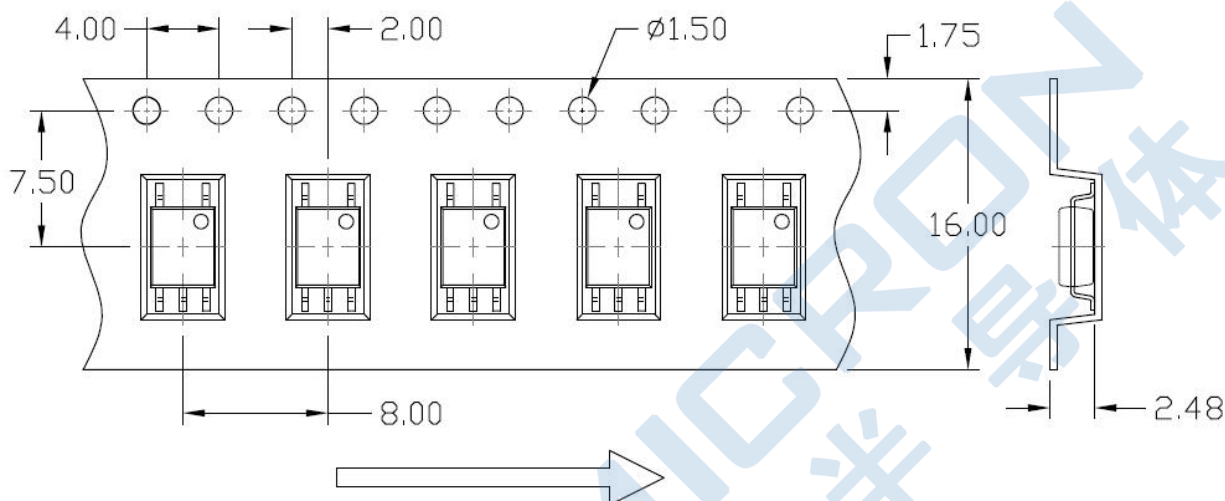
Recommended Solder Mask



- Dimensions in mm unless otherwise stated

CARRIER TAPE SPECIFICATIONS

Option SM-SL



- Dimensions in mm unless otherwise stated

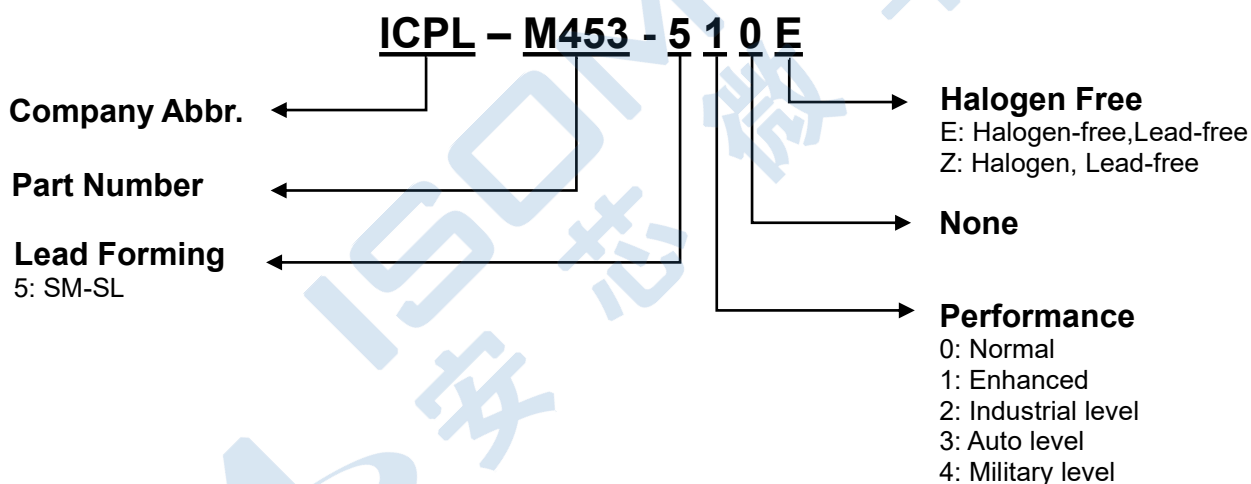
ORDERING AND MARKING INFORMATION

Marking Information



ICPL : Company Abbr.
 M453 : Part Number
 / : ISOMICRON
 YY : Fiscal Year
 WW : Work Week
 A : Manufacturing Code

Order Code

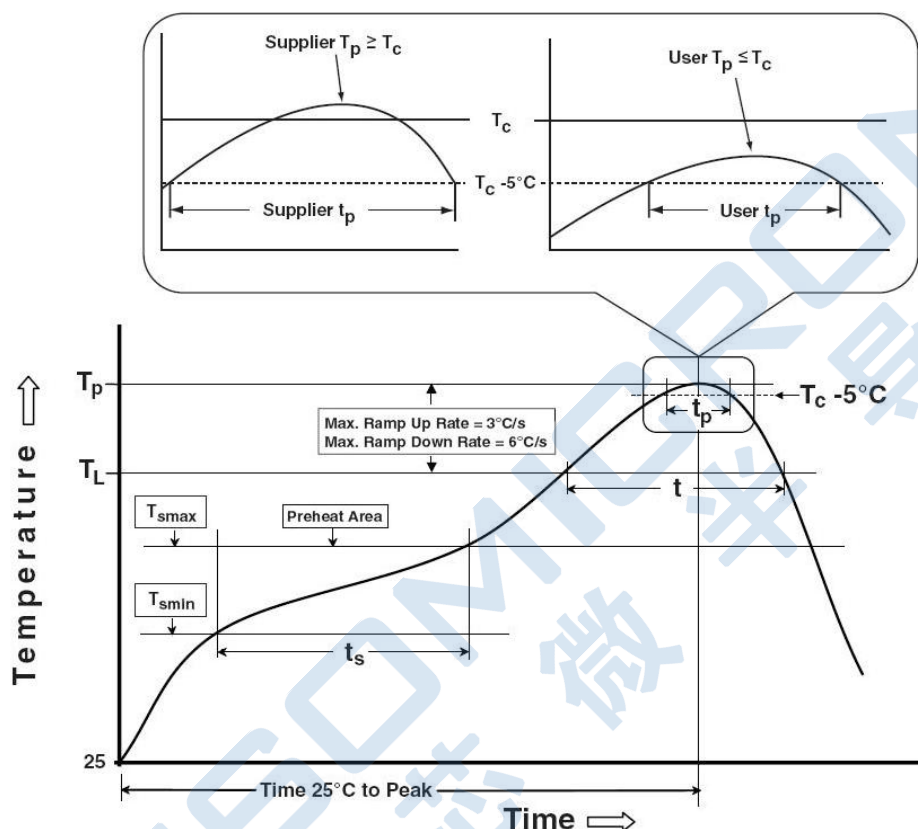


Packing Quantity

Option	Quantity	Quantity – Inner box	Quantity – Outer box
SM-SL	3000 Units/Reel	2 Reels/Inner box	5 Inner box/Outer box = 30k Units

REFLOW INFORMATION

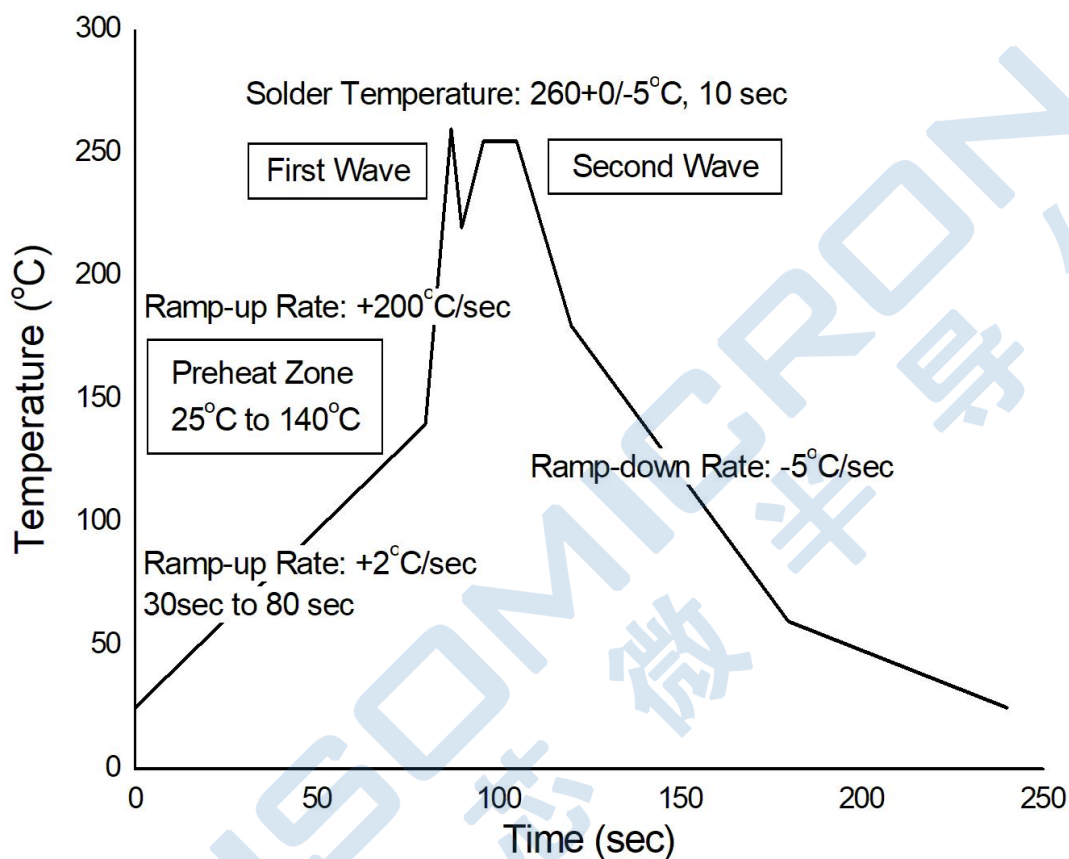
Reflow Profile



Profile Feature	Sn-Pb Assembly Profile	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	100	150°C
Temperature Max. (Tsmax)	150	200°C
Time (ts) from (Tsmin to Tsmax)	60-120 seconds	60-120 seconds
Ramp-up Rate (tL to tP)	3°C/second max.	3°C/second max.
Liquidous Temperature (TL)	183°C	217°C
Time (tL) Maintained Above (TL)	60 – 150 seconds	60 – 150 seconds
Peak Body Package Temperature	235°C +0°C / -5°C	260°C +0°C / -5°C
Time (tP) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (TP to TL)	6°C/second max	6°C/second max
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

TEMPERATURE PROFILE OF SOLDERING

Wave Soldering (JESD22-A111 Compliant)



Hand Soldering By Soldering Iron

Soldering Temperature	$380 \pm 0/-5^{\circ}\text{C}$
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

- ISOMICRON is continually improving the quality, reliability, function and design. ISOMICRON reserves the right to make changes without further notices.
- The characteristic curves shown in this datasheet are representing typical performance which are not guaranteed.
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- This product is not intended to be used for military, aircraft, automotive, medical, life sustaining or lifesaving applications or any other application which can result in human injury or death.
- Please contact ISOMICRON 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 ISOMICRON'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.