

Description

The ICPR17x series is a 1 form A (normally open switch) that can replace electromechanical relays in many applications. It consists an infrared emitting diode optically coupled to a photo-MOSFET in a SOP4 package, and has a peak off-State voltage of 60V~600 V.

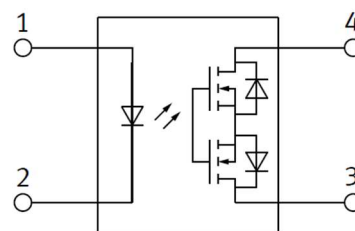
Features

- Normally opened (SPST)
- Control 60V~600V AC or DC voltage
- Switch 40mA~1250mA load
- Controls low-level analog sings
- High sensitivity, low conductivity resistance
- Low-level off state leakage current
- High isolation voltage 3750V
- Lead free, meet RoHS standards

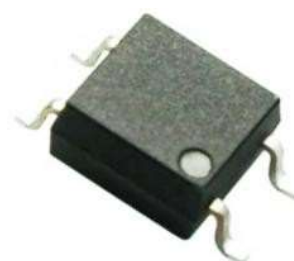
Applications

- Modem/sensor
- Mobile phones/security equipment
- Measuring and testing equipment
- Plant automation equipment
- High-speed inspection machines

SCHEMATIC



PACKAGE OUTLINE



Order Information

I/O isolation voltage	Output rating		Single Channel	Packing quantity
	Load voltage	Load current		
3,750 Vrms (High insulation)	60V	500mA	ICPR172	See page11
	100V	1250mA	ICPR173	
	400V	120mA	ICPR174	
	600V	40mA	ICPR176	

ABSOLUTE MAXIMUM RATINGS(Ambient temperature: 25°C)

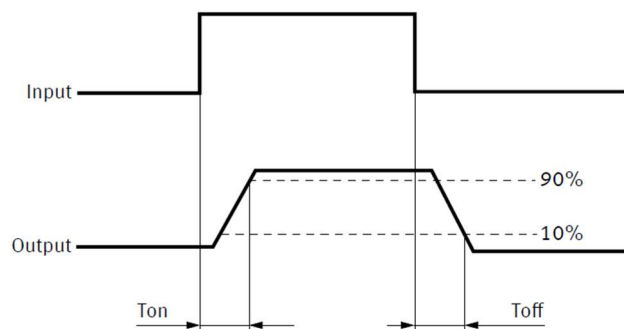
Item		Symbol	172	173	174	176		Unit	Remark
Input	LED forward current	I _F	50					mA	
	LED reverse voltage	V _R	5					V	
	Peak forward current	I _{FP}	1					A	f = 100 Hz,Duty Ratio = 0.1%
	Power dissipation	P	75					mW	
Output	Load voltage (peak AC)	V _L	60	100	400	600		V	
	Continuous load current	I _L	0.5	1.25	0.12	0.04		A	
	Peak load current	I _{peak}	1.5	3.7	0.3	0.15		A	100 ms (1 shot), V _L = DC
	Power dissipation	P _{out}	300					mW	
I/O isolation voltage		V _{iso}	3,750					VAC	(Avoid icing and condensation)
Ambient temperature	Operating	T _{opr}	−40°C ~ + 85°C					°C	Non-condensing at low temp
	Storage	T _{stg}	−40°C ~ + 100°C						

ELECTRICAL OPTICAL CHARACTERISTICS at Ta=25°C

Parameter			Symbol	Condition	172	173	174	176		Unit
Input	LED operate	Typ.	I _{Fon}	I _L =Max.	0.4					mA
	Current	Max.			3.0					
	LED turn off	Min.	I _{Foff}	I _L =Max.	0.3					mA
	Current	Typ.			3.0					
	LED dropout	Typ.	V _F	I _F =5mA	1.3					V
	Voltage	Max.			1.4					
Output	On resistance	Typ.	R _{on}	I _F =5mA, I _L =Max., Within1 S	0.9	0.48	10	36		Ω
		Max.			1.5	1.5	20	40		
	Off state leakage current	Min.	I _{Leak}	I _F =0mA, V _L =Max	1000					nA
Transfer characteristics	Turn on time*	Typ.	T _{on}	I _F =5mA, I _L =Max	0.17	0.117	0.094	0.06		ms
		Max.			0.3	0.2	0.2	0.15		
	Turn off time*	Typ.	T _{off}	I _F =5mA, I _L =Max	0.14	0.417	0.174	0.16		ms
		Max.			0.3	0.7	0.2	0.4		
	I/O capacitance	Typ.	C _{iso}	f=1MHz, V _B =0	0.8					pF
		Max.			1.5					
	Initial I/O isolation resistance	Min.	R _{iso}	500V DC	1000					MΩ

Note: The recommended value of LED forward current is $I_F=5$ to $10mA$

*Turn on/Turn off time



CHARACTERISTIC CURVES

Fig.1 Load current vs. ambient temperature characteristics

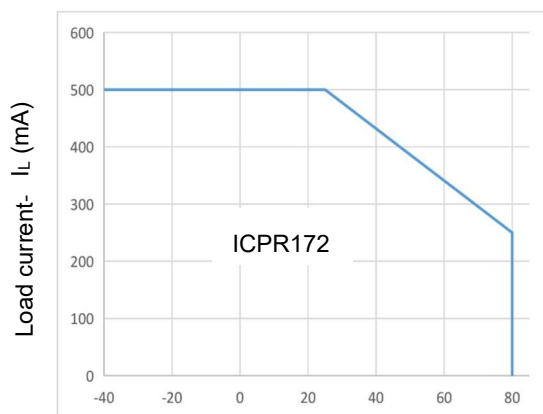
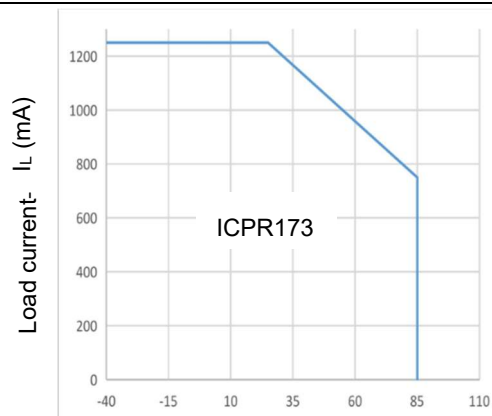
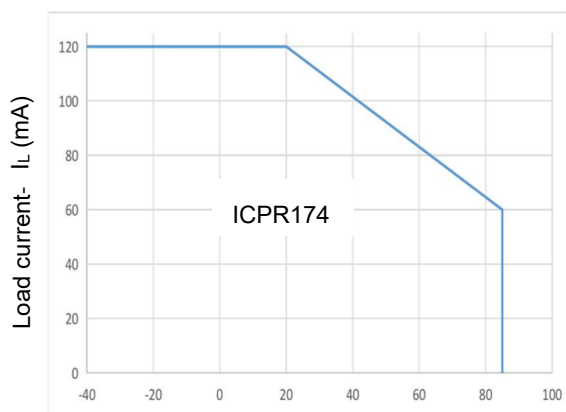
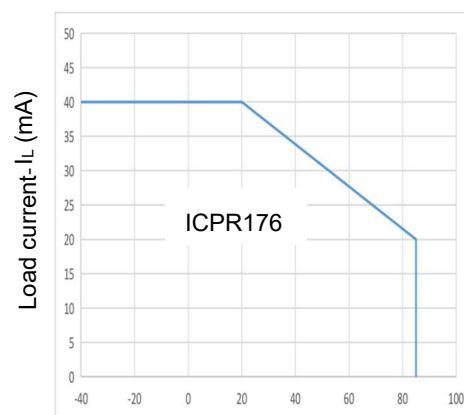
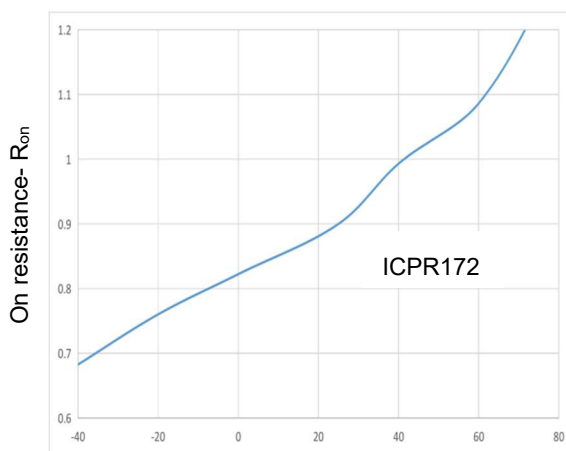
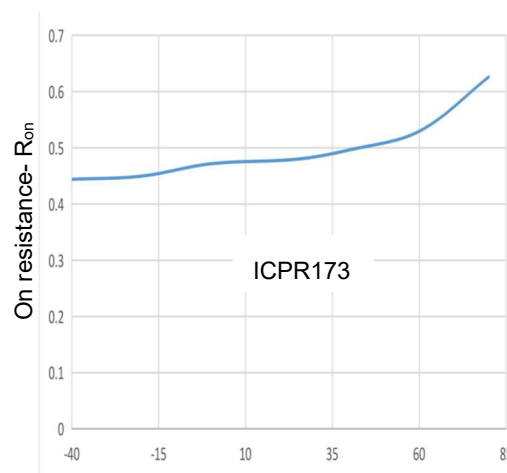
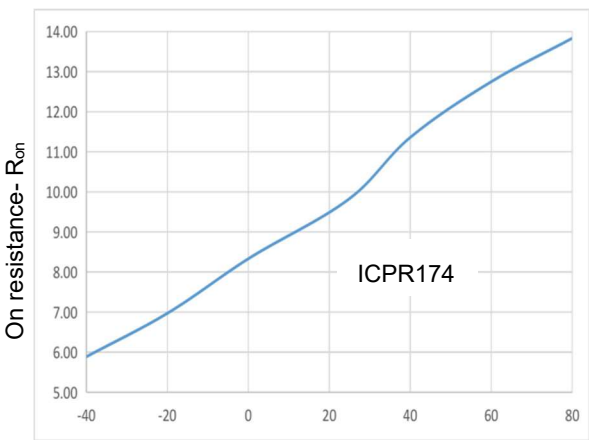
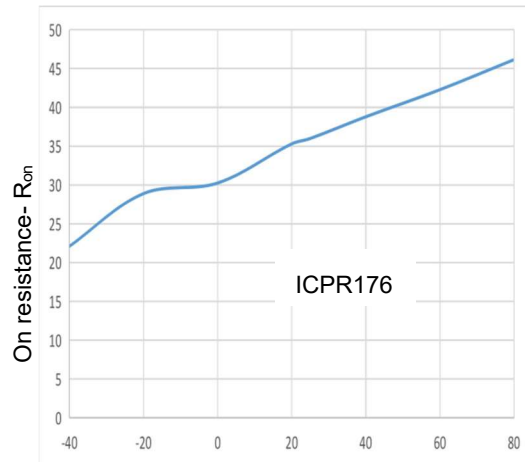
Ambient temperature- T_A (°C)Ambient temperature- T_A (°C)Ambient temperature- T_A (°C)Ambient temperature- T_A (°C)

Fig.2 On resistance vs. ambient temperature characteristics

Ambient temperature- T_A (°C)Ambient temperature- T_A (°C)

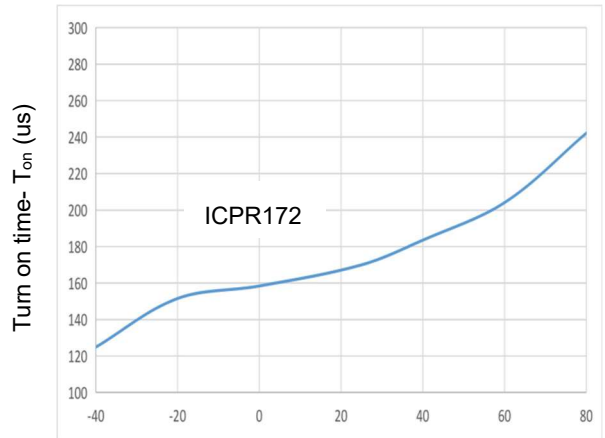


Ambient temperature- $T_A(^{\circ}C)$

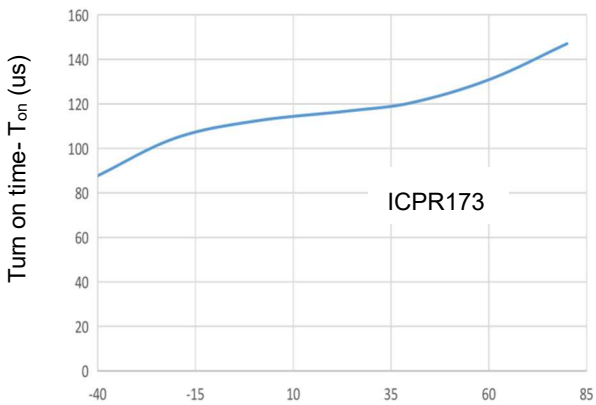


Ambient temperature- $T_A(^{\circ}C)$

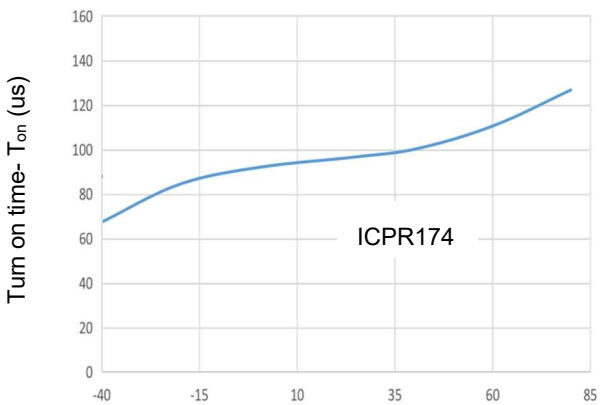
Fig.3 Turn on time vs. ambient temperature characteristics



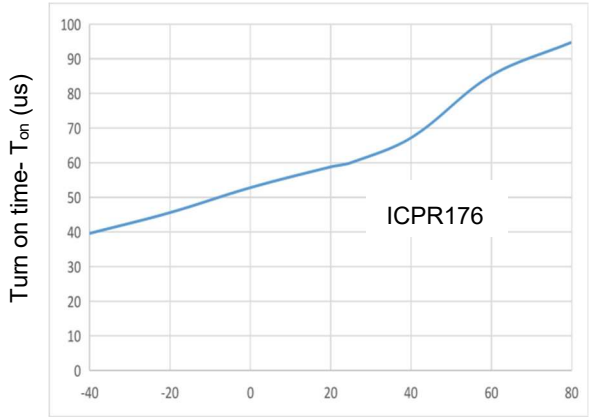
Ambient temperature- $T_A(^{\circ}C)$



Ambient temperature- $T_A(^{\circ}C)$



Ambient temperature- $T_A(^{\circ}C)$



Ambient temperature- $T_A(^{\circ}C)$

CHARACTERISTIC CURVES

Fig.4 Turn off time vs. ambient temperature characteristics

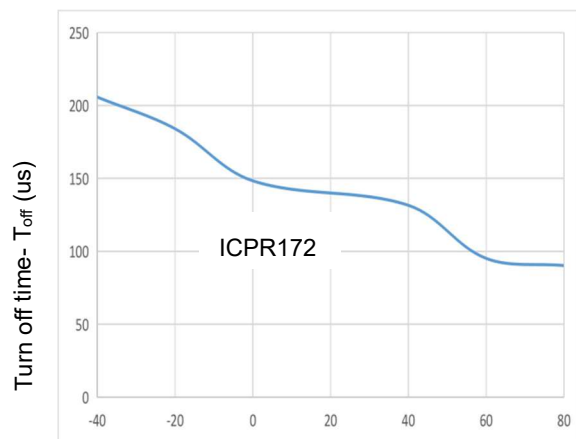
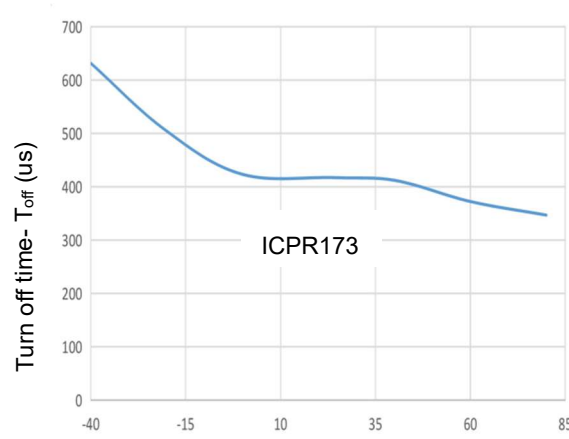
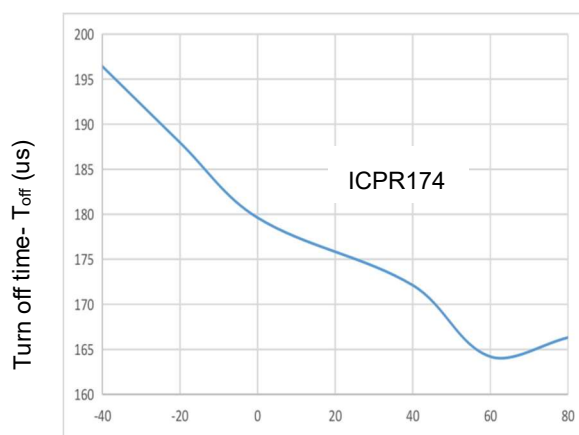
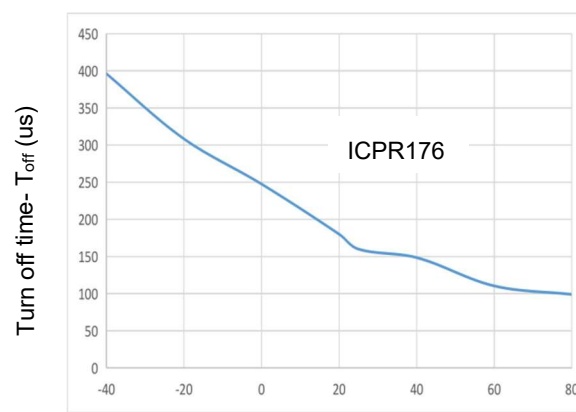
Ambient temperature- T_A (° C)Ambient temperature- T_A (° C)Ambient temperature- T_A (° C)Ambient temperature- T_A (° C)

Fig.5 LED operate current vs. ambient temperature characteristics

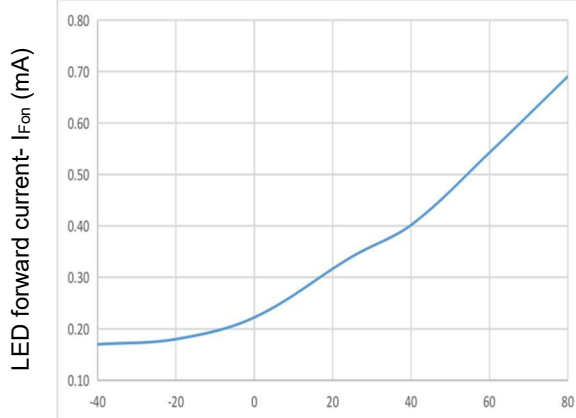
Ambient temperature- T_A (° C)

Fig.6 LED turn off current vs. ambient temperature characteristics

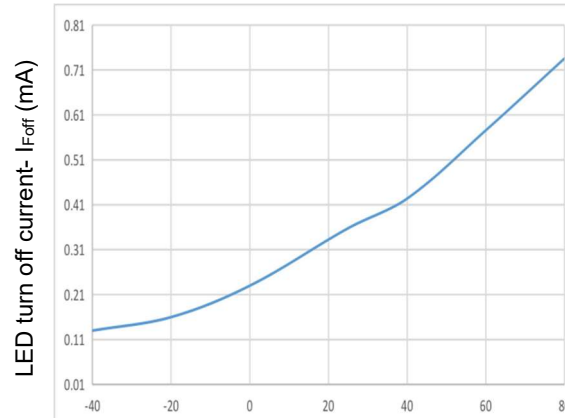
Ambient temperature- T_A (° C)

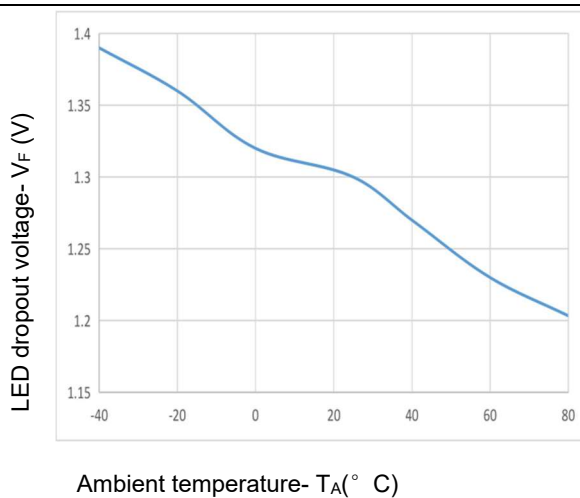
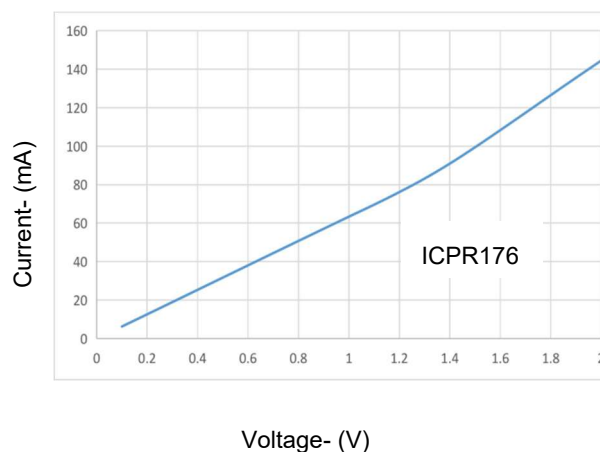
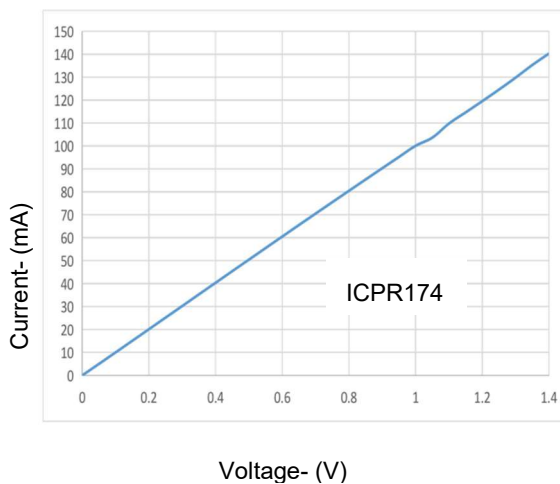
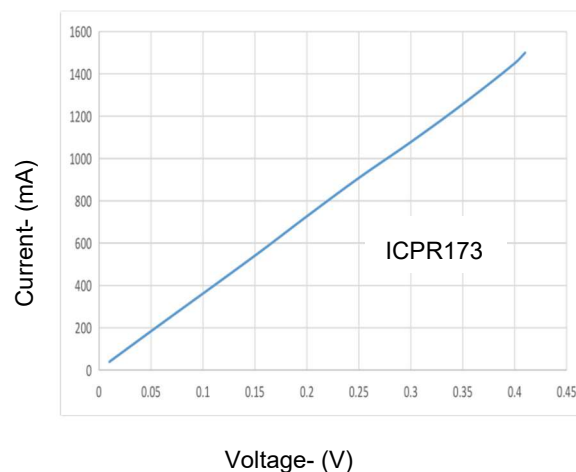
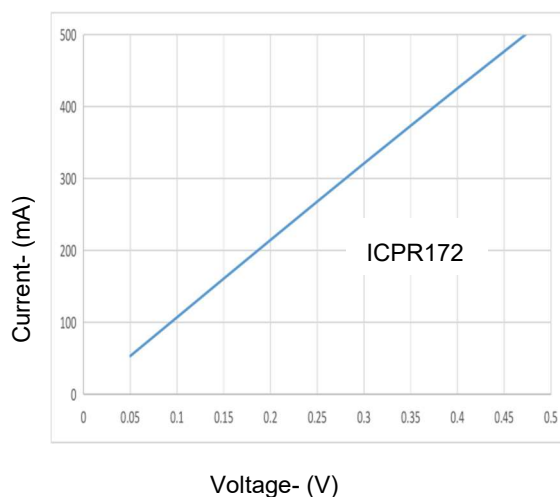
Fig.7 LED dropout voltage vs. ambient temperature characteristics**Fig.8 Current vs. voltage characteristics of output at MOS portion**

Fig.9 Off state leakage current vs. load voltage characteristics

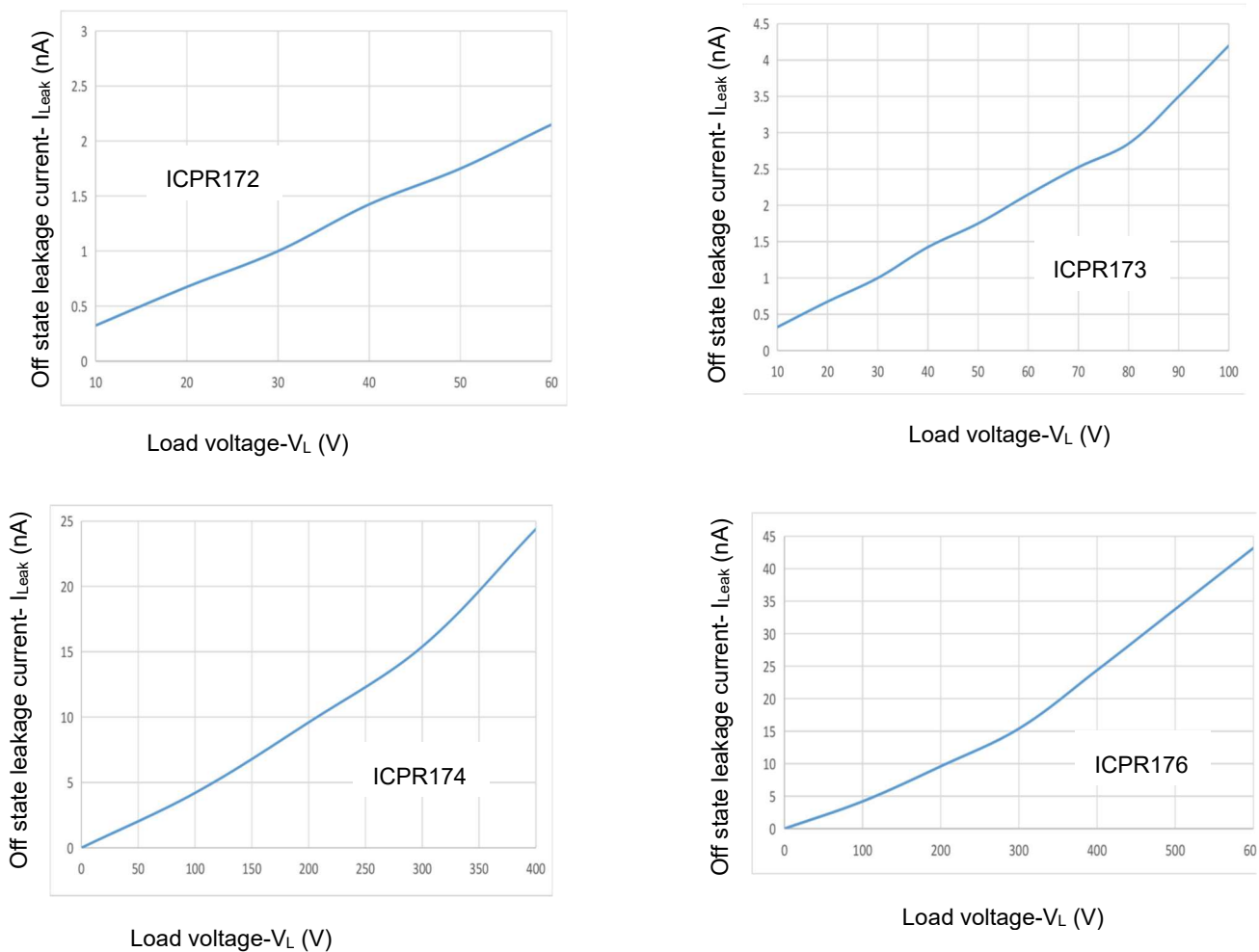
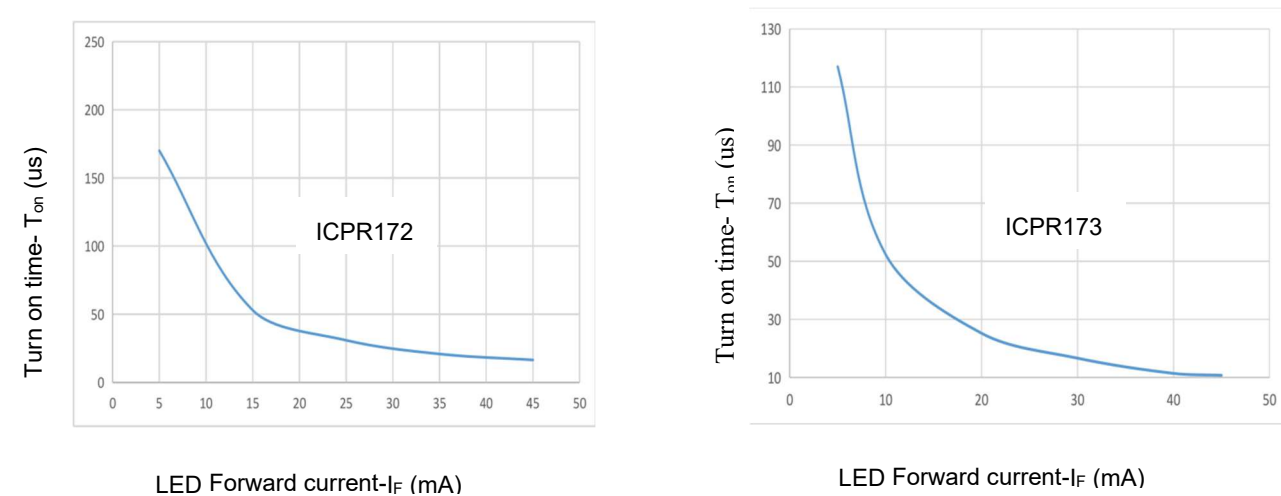
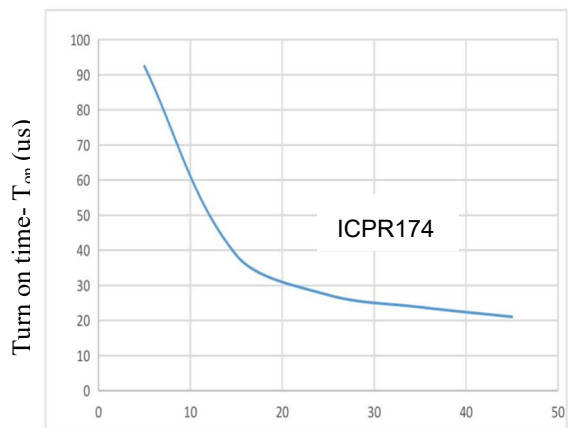
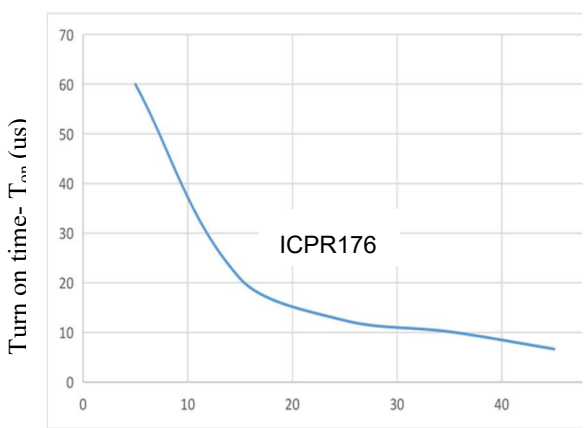


Fig.10 Turn on time vs. LED forward current characteristics



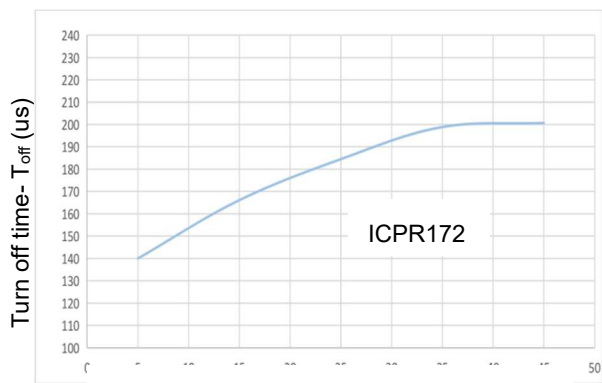


LED Forward current- I_F (mA)

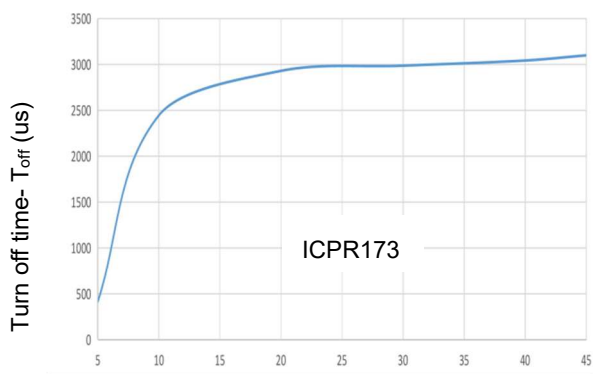


LED Forward current- I_F (mA)

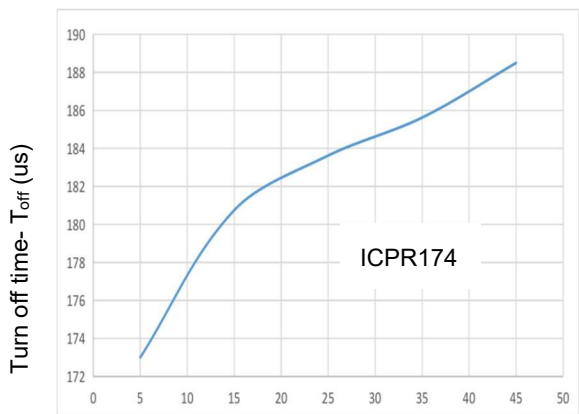
Fig.11 Turn off time vs. LED forward current characteristics



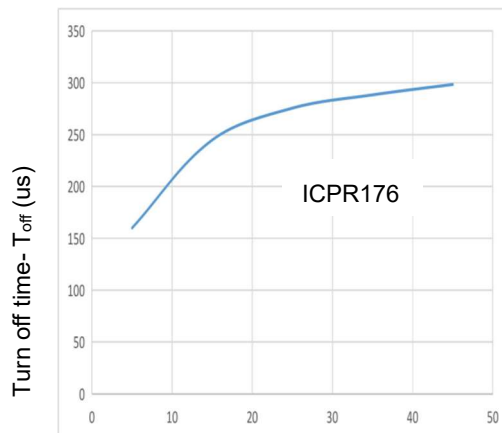
LED Forward current- I_F (mA)



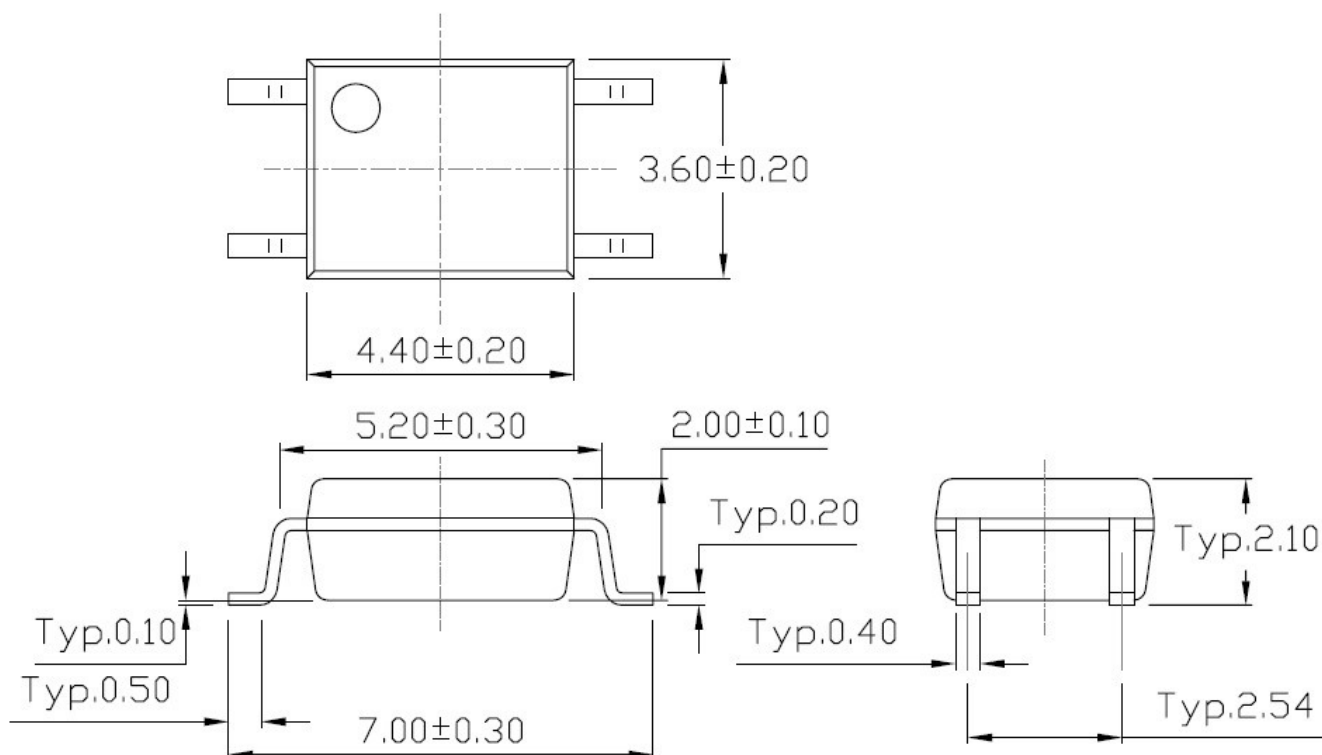
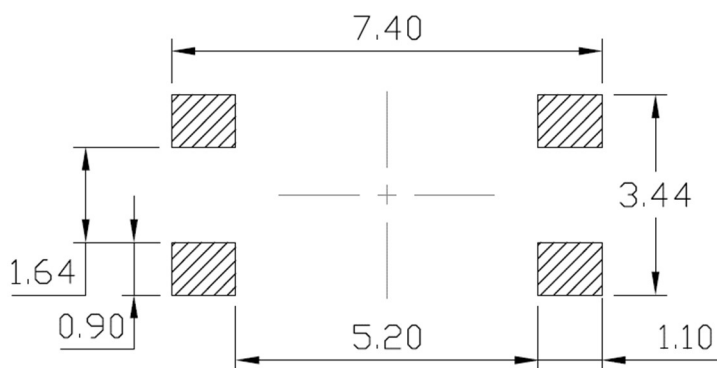
LED Forward current- I_F (mA)



LED Forward current- I_F (mA)

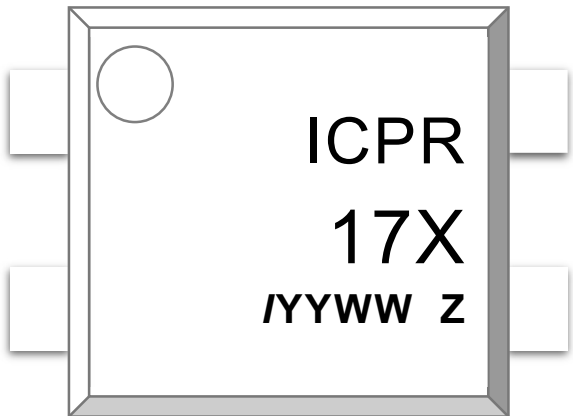


LED Forward current- I_F (mA)

PACKAGE DIMENSIONS SOP4 (Dimensions in mm unless otherwise stated)**Recommended Solder Mask (Dimensions in mm unless otherwise stated)**

ORDERING AND MARKING INFORMATION

MARKING INFORMATION

	ICPR : Company Abbr. 17X : Part Number / : ISOCOM MICRON YY : Fiscal Year WW : Work Week Z : Manufacturing Code,Z=A/B/C/None
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ORDERING INFORMATION

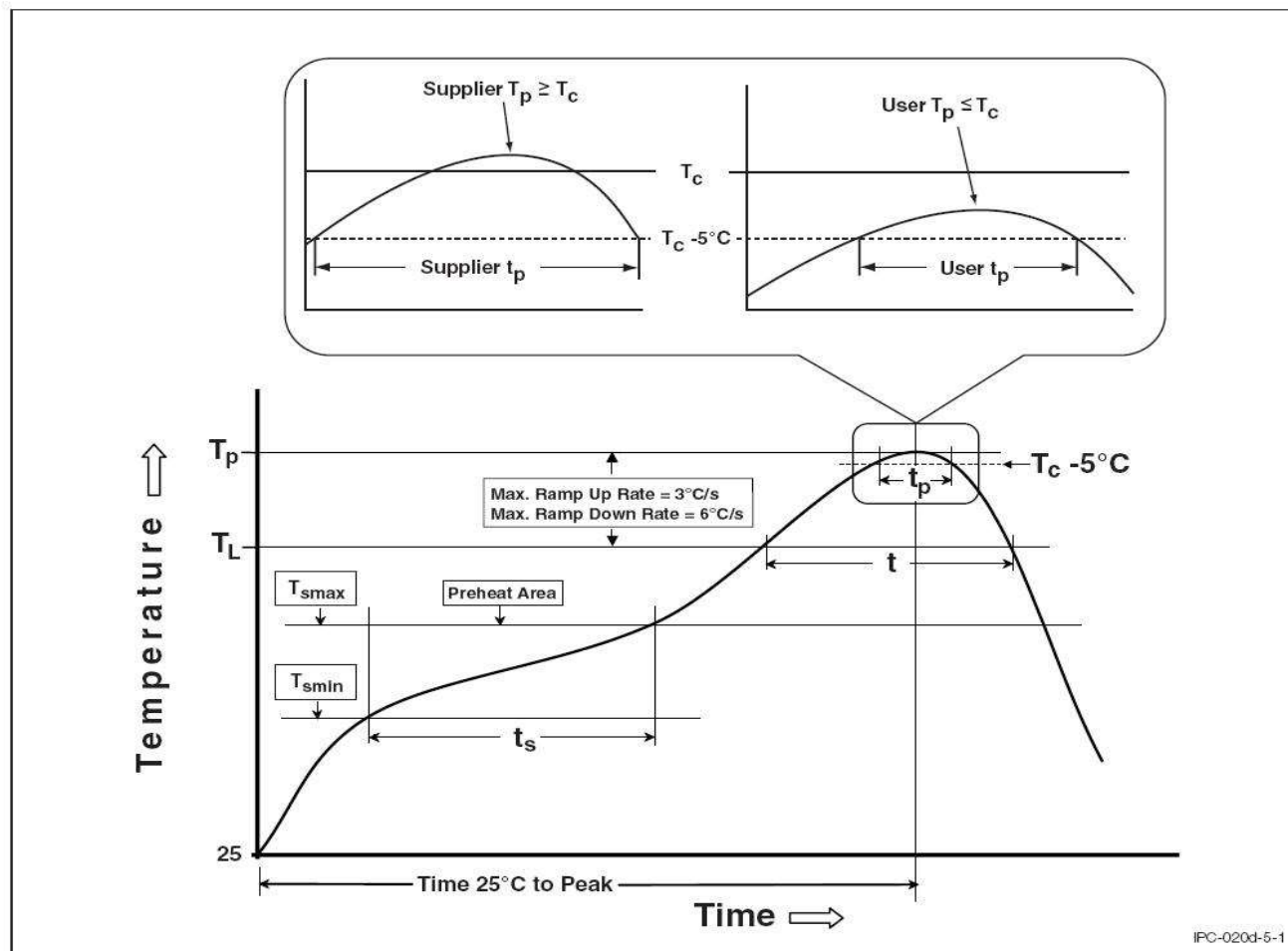
Company Abbr. ← ICPR Part Number X=2,3,4,6 ← 17X Lead Forming 5: SOP4 ← 5	ICPR 17X - 5 0 0 E → 0 Halogen free E: Halogen-free, Lead-free Z: Halogen, Lead-free → 0 Performance 0: Normal, Black 1: Enhanced, White 2: Auto Level → 0 Packing 0: T1 1: T2
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PACKING QUANTITY

Option	Quantity	Quantity – Inner box	Quantity – Outer box
T1	3000 Units/Reel	2 Reels/Inner box	5 Inner box/Outer box = 30k Units
T2	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. (T_{smin})	100	150°C
Temperature Max. (T_{smax})	150	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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