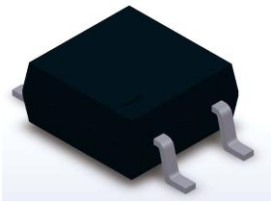
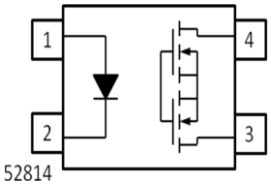
DATASHEET

4PIN MINI FLAT PACKAGE SOLID STATE RELAY
ELM4XXA SERIES



Schematic



Pin Configuration
1,LED Anode
2.LED Cathode
3.4, MOSFET

Features

- Compliance Halogen Free(Br < 900ppm, Cl < 900ppm, Br+Cl < 1500ppm)
- Normally open signal pole signal throw relay
- Small 4pin SOP package in the 400V & 600V load voltage series
- Lower operation current
- Low-level off state leakage current
- Low on resistance
- Compliance with EU REACH
- Pb free and RoHS compliant
- UL and cUL (approved)
- VDE (approved)
- SEMKO (approved)
- NEMKO (approved)
- FIMKO (approved)
- CQC (approved)

Description

The ELM4XXA is solid state relays containing an AlGaAs infrared LEDs on the light emitting side (input side) optically coupled to a high voltage output detector circuit. The detector consists of a photovoltaic diode array and MOSFETs on the output side. The single channel configuration is equivalent to 1 form A EMR. The devices in a 4-pin small outline SMD package

Applications

- Exchange equipment
- Measurement and testing equipment
- FA/OA equipment
- Industrial controls
- Security

Absolute Maximum Ratings (T_A=25 °C, unless otherwise specified)

Parameter		Symbol	Rating		Unit
			ELM440A	ELM460A	
Input	Forward Current	I_F	50		mA
	Reverse Voltage	V_R	5		V
	Peak Forward Current*1	I_{FP}	1		A
	Power Dissipation	P_{in}	75		mW
Output	Break Down Voltage	V_L	400	600	V
	Continuous Load Current	I_L	120	50	mA
	Pulse Load Current*2	I_{LPeak}	0.3	0.15	A
	Power Dissipation	P_{out}	500		mW
Total Power Dissipation		P_T	550		mW
Isolation Voltage*3		V_{iso}	3750		Vrms
Storage Temperature		T_{STG}	-40 to 125		°C
Operating Temperature		T_{OPR}	-40 to 85		°C
Soldering Temperature*4		T_{SOL}	260		°C

Notes:
*1. f =100Hz, Duty Cycle = 0.1%
*2. A connection: 100ms (1 shot), V_L = DC
*3. AC for 1 minute, R.H. = 40 ~ 60% R.H. In this test, pins 1, 2 are shorted together, and pins 3, 4 are shorted together.
*4. For 10 seconds

Electro-Optical Characteristics (T_A=25 °C)

	Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit
Input	Forward Voltage		V_F	I_F = 10mA	-	1.18	1.5	V
	Reverse Current		I_R	V_R = 5V	-	-	1	μA
Output	Off State leakage Current		I_{leak}	I_F = 0mA, V_L = Max.	-	-	1	μA
	On Resistance	ELM440A	$R_{d(ON)}$	I_F = 10mA, I_L = Max. t = 1s	-	20	30	Ω
		ELM460A				40	70	
	Output Capacitance	ELM440A	C_{out}	V_L = 0V, f = 1MHz	-	45	-	pF
		ELM460A				30		
Transfer Characteristics	LED turn on Current	ELM440A	$I_{F(on)}$	I_L = Max.	-	1	5	mA
		ELM460A						
	LED turn off current	ELM440A	$I_{F(off)}$	I_L = 1μA	0.2	0.6	-	mA
		ELM460A						
	Turn On Time	ELM440A	T_{on}	I_F = 10 mA, I_L = MAX. R_L = 200Ω ,	-	0.1	0.5	ms
		ELM460A						
	Turn Off Time	ELM440A	T_{off}			0.2		ms
		ELM460A						
	Isolation Resistance		R_{I-O}	V_{I-O} = 500V DC	5×10^{10}	-	-	Ω
	Isolation Capacitance		C_{I-O}	V = 0V, f = 1MHz	-	1.5	-	pF

Typical Electro-Optical Characteristics Curves

Figure 1. Load current vs Ambient temperature

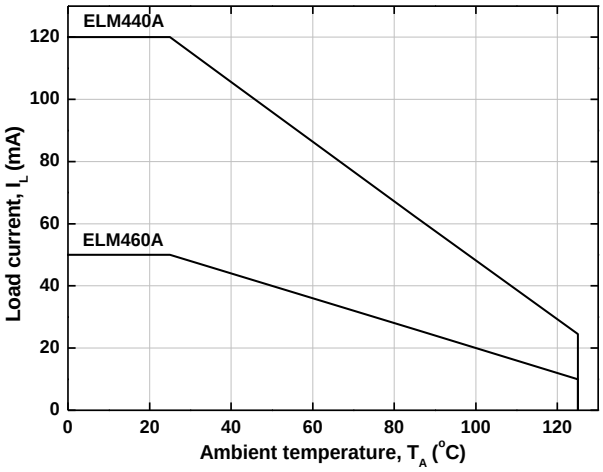


Figure 2. On Resistance vs Ambient Temperature

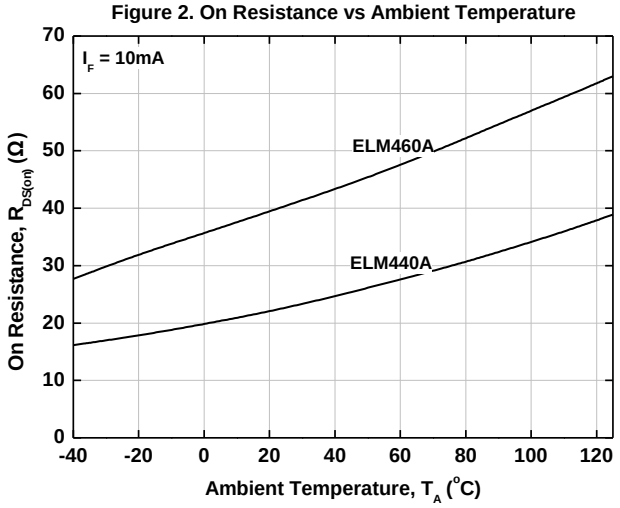


Figure 3. Switching Time vs Ambient Temperature

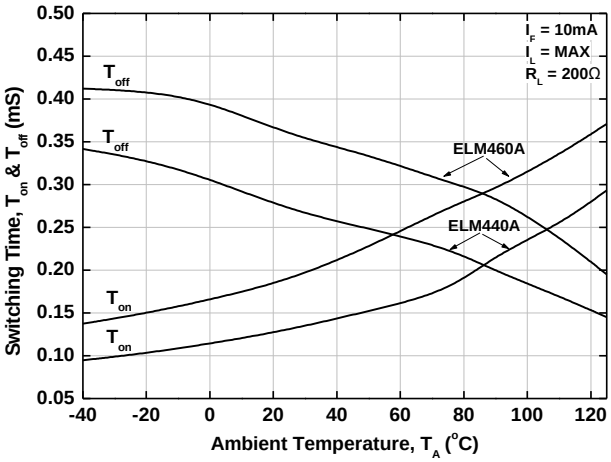


Figure 4. Switching time vs LED forward current

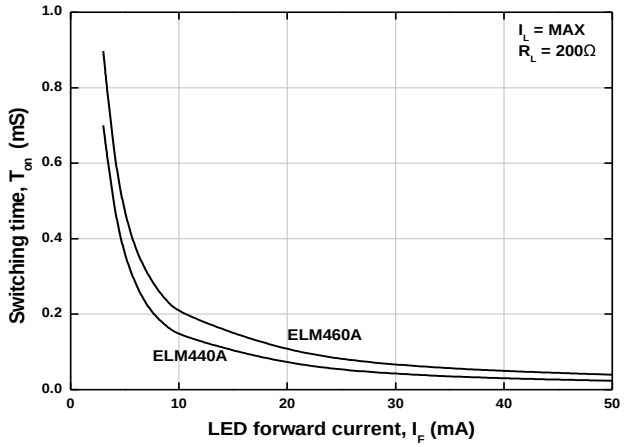


Figure 5. Switching time vs LED forward current

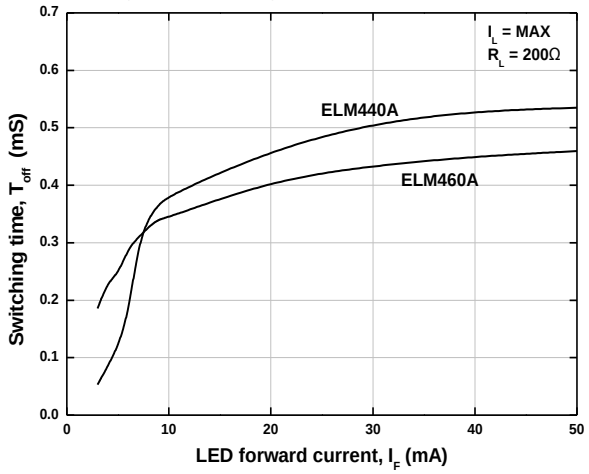


Figure 6. Normalized LED Operate on Current vs Ambient Temperature

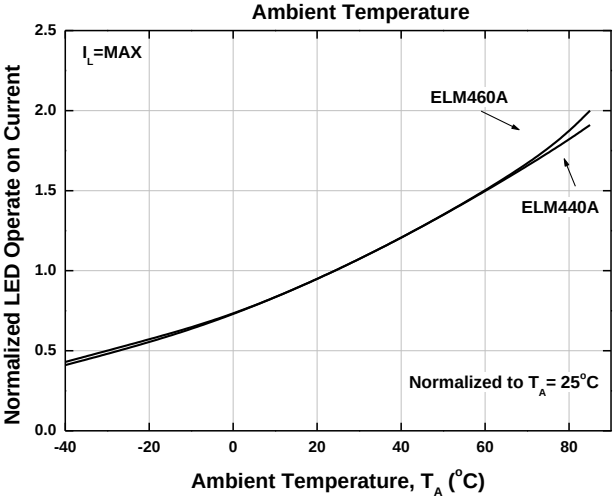


Figure 7. Normalized LED Operate off Current vs Ambient Temperature

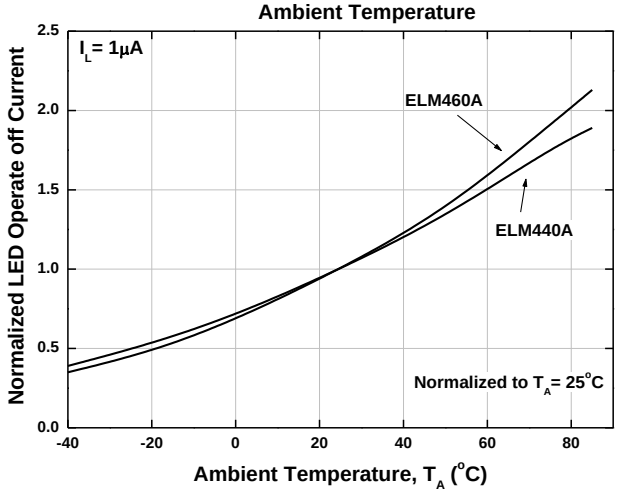


Figure 8. LED Dropout Voltage vs Ambient Temperature

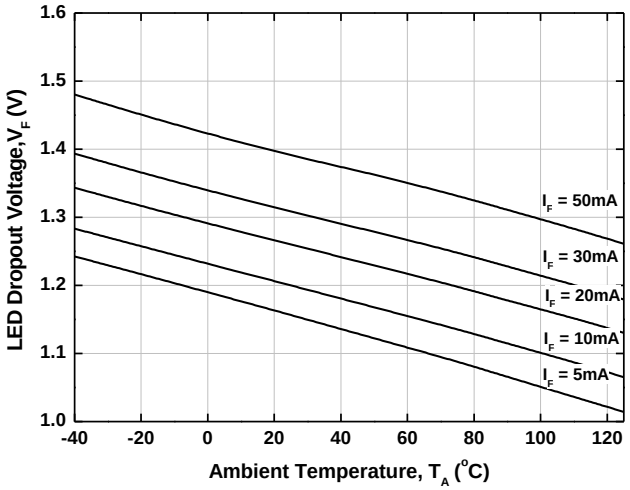


Figure 9. Load voltage vs Load current

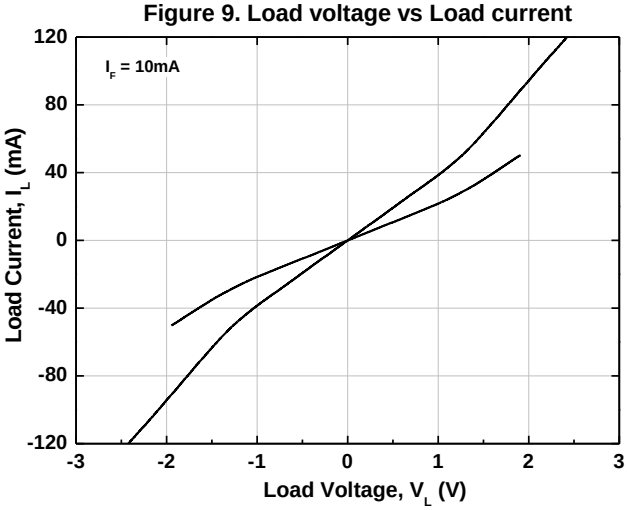


Figure 10. Off state leakage Current vs Load voltage

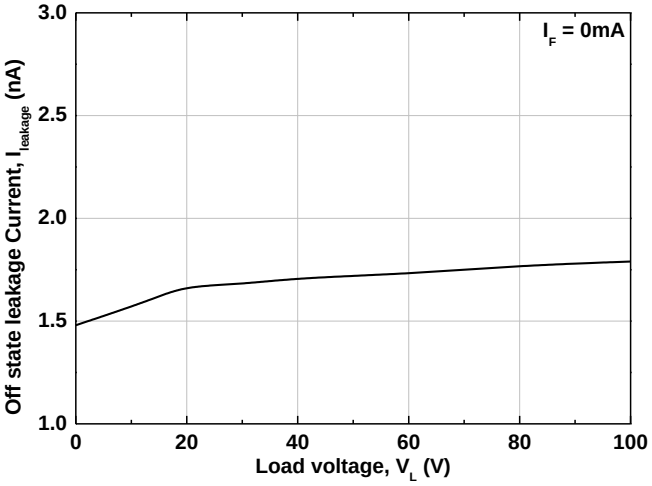
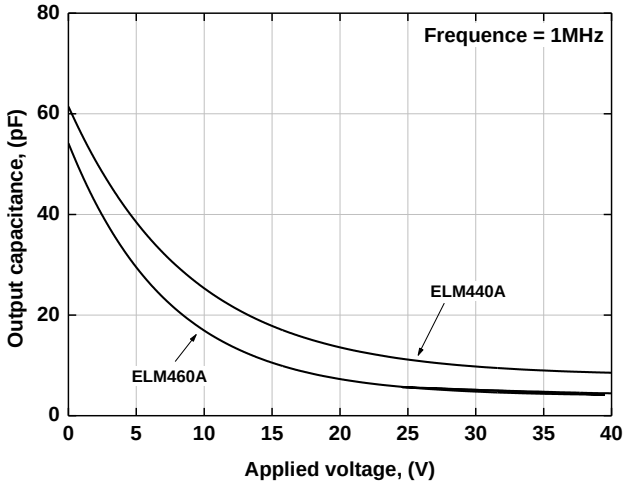
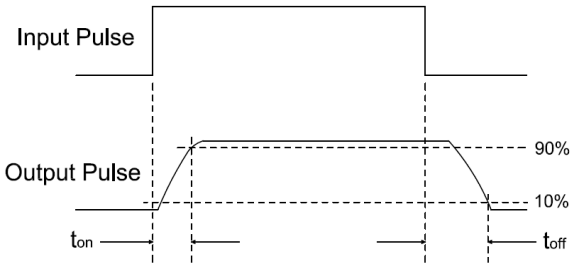


Figure 11. Applied voltage VS Output capacitance



Turn on/Turn off Time



Order Information

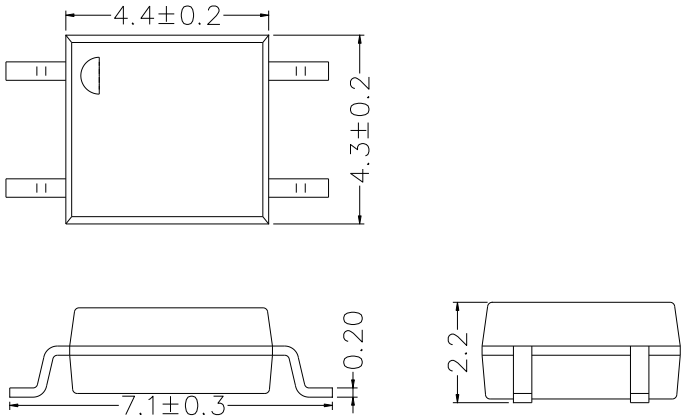
Part Number

ELM4XXA(X)-VG

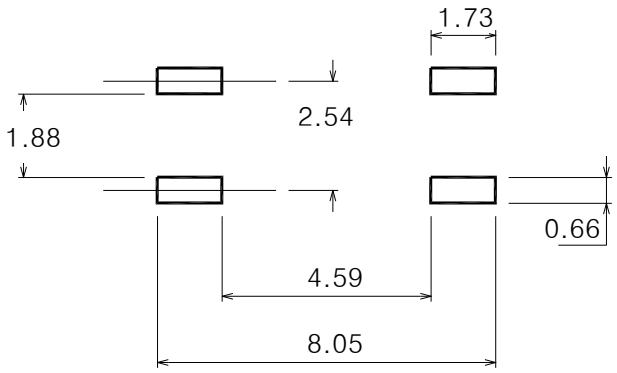
Note:
4XXA = Part No.(440A:400V 460A:600V)
X = Tape and reel option (TA, TB or none).
V = VDE (option)
G = Halogen free

Option	Description	Packing quantity
None	Standard SMD option	100 units per tube
-V	Standard SMD option + VDE	100 units per tube
(TA)	TA Tape & reel option	3000 units per reel
(TB)	TB Tape & reel option	3000 units per reel
(TA)-V	TA Tape & reel option + VDE	3000 units per reel
(TB)-V	TB Tape & reel option + VDE	3000 units per reel

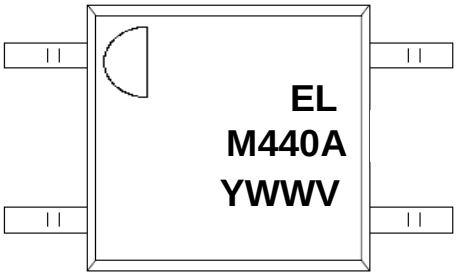
Package Dimension (Dimensions in mm)



Recommended Pad Layout for Surface Mount Leadform



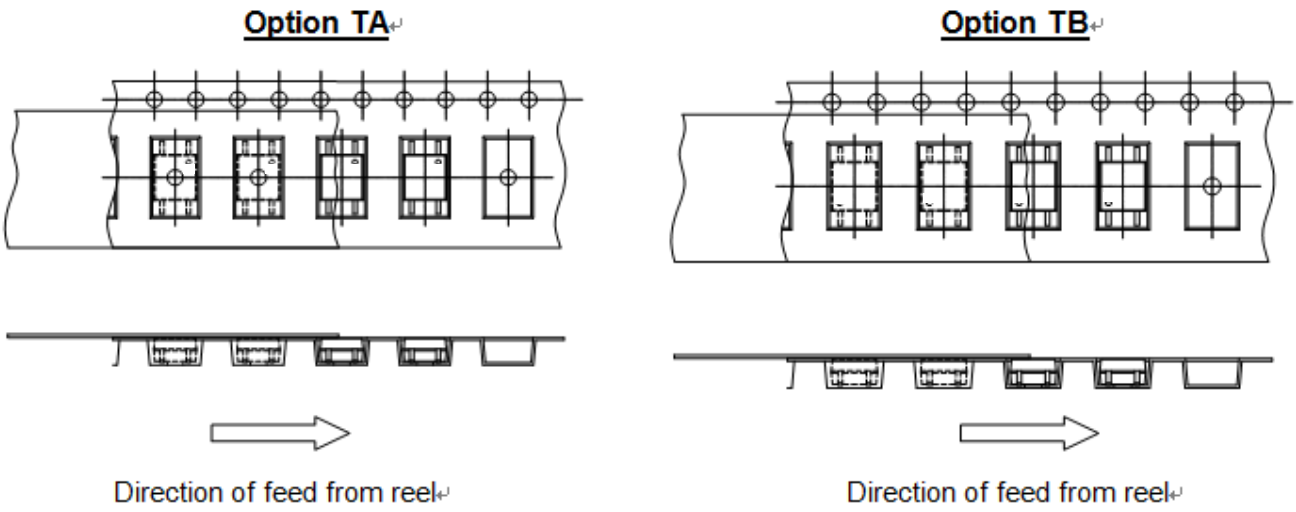
Device Marking



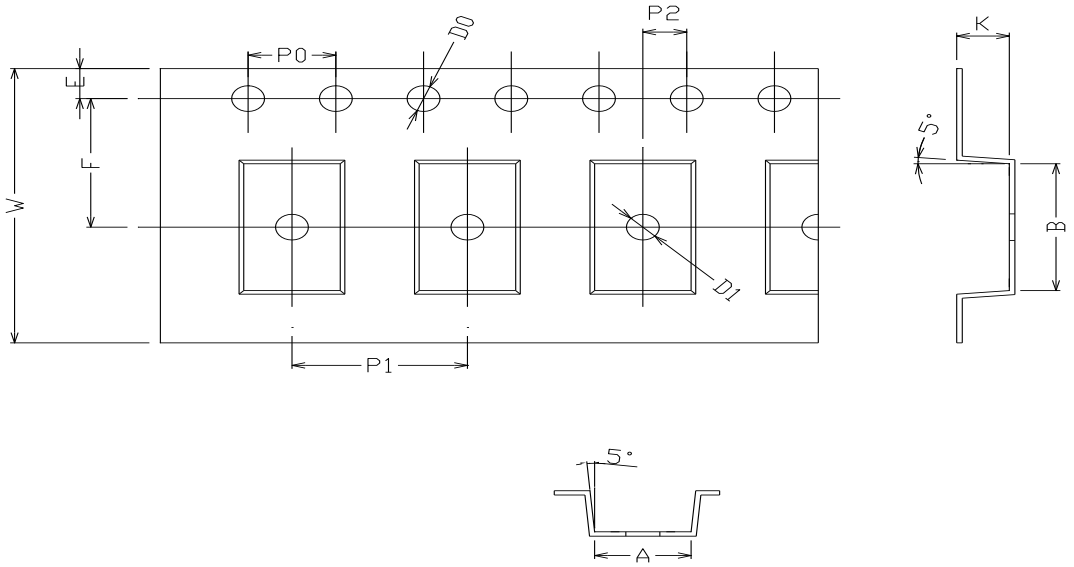
Notes

EL	denotes Everlight
M440A	denotes Part Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
V	denotes VDE approved (optional)

Tape & Reel Packing Specifications



Tape dimensions

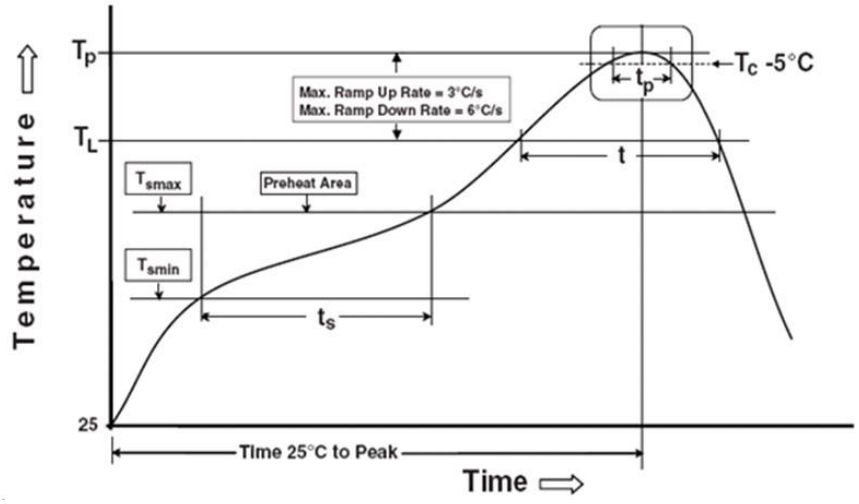


Dimension No.	**A**	**B**	**Do**	**D1**	**E**	**F**
Dimension (mm)	4.4 ± 0.1	7.4 ± 0.1	1.5 + 0.1/-0	1.5 ± 0.1	1.75± 0.1	7.5 ± 0.05
Dimension No.	**Po**	**P1**	**P2**	**t**	**W**	**K**
Dimension (mm)	4.0 ± 0.15	8.0 ± 0.1	2.0 ± 0.1	0.25 ± 0.03	16.0 ± 0.2	2.4± 0.1

Precautions for Use

1. Soldering Condition

1.1 (A) Maximum Body Case Temperature Profile for evaluation of Reflow Profile



Note: Reference: IPC/JEDEC J-STD-020D

Preheat	
Temperature min (T_{smin})	150 °C
Temperature max (T_{smax})	200°C
Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max
Other	
Liquidus Temperature (T_L)	217 °C
Time above Liquidus Temperature (t_L)	60-100 sec
Peak Temperature (T_P)	260°C
Time within 5 °C of Actual Peak Temperature: T_P - 5°C	30 s
Ramp- Down Rate from Peak Temperature	6°C /second max.
Time 25°C to peak temperature	8 minutes max.
Reflow times	3 times

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