



BRIGHTTEK
BRIGHTTEK (EUROPE) LIMITED

Brighten Up The World With LED!



ISO/TS 16949:2009



BS EN ISO 14001:2004



QC 080000 IECQ HSPM

PRODUCT DATASHEET



- ▶ DC Input Photo Coupler
- ▶ SMD8 Low Profile
- ▶ High Speed Transistor
1Mbit/s

6N135(SL)(T1)-GV
6N136(SL)(T1)-GV



Release Date: 06 September 2024 Version: A01



6N13X(SL) Series



DESCRIPTION:

The 6N13X(SL) series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon high speed photo transistor in a plastic DIP8 package with SMD8 Low Profile lead forming option. A separate design between photodiode and transistor reduces the base-collector capacitance of the input transistor which improves the speed by several orders of magnitude over conventional phototransistor optocouplers.

FEATURES:

- High isolation 5000 Vrms
- DC input with transistor output
- Operating temperature range -55°C to +100°C
- REACH & RoHS compliance
- MSL class 1
- Regulatory Approvals:
 - UL - UL1577
 - VDE - EN60747-5-5 (VDE0884-5)
 - CQC - GB4943.1, GB8898
 - cUL - CSA Component Acceptance Service Notice 5A

APPLICATIONS:

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



Partner with: LIGHTNING

NAMING & ORDERING INFORMATION:

Naming Information:

6N135 (SL) (T1) - G V 6N136 (SL) (T1) - G V	
6N135 6N136	Part Number
SL	Lead Form Option: SMD8 Low Profile
T1	Selection: Tape and Reel Option (T1(default)/T2)
G	Green Option
V	VDE Option

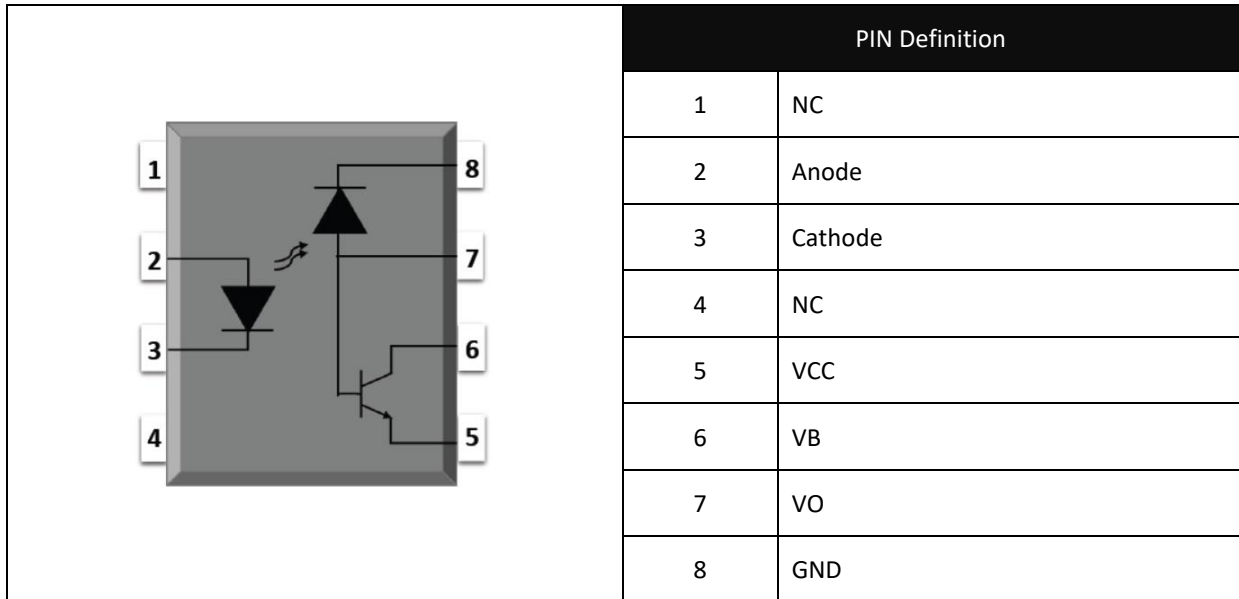
Ordering Information:

6N135(SL)(T1)-GV 6N136(SL)(T1)-GV

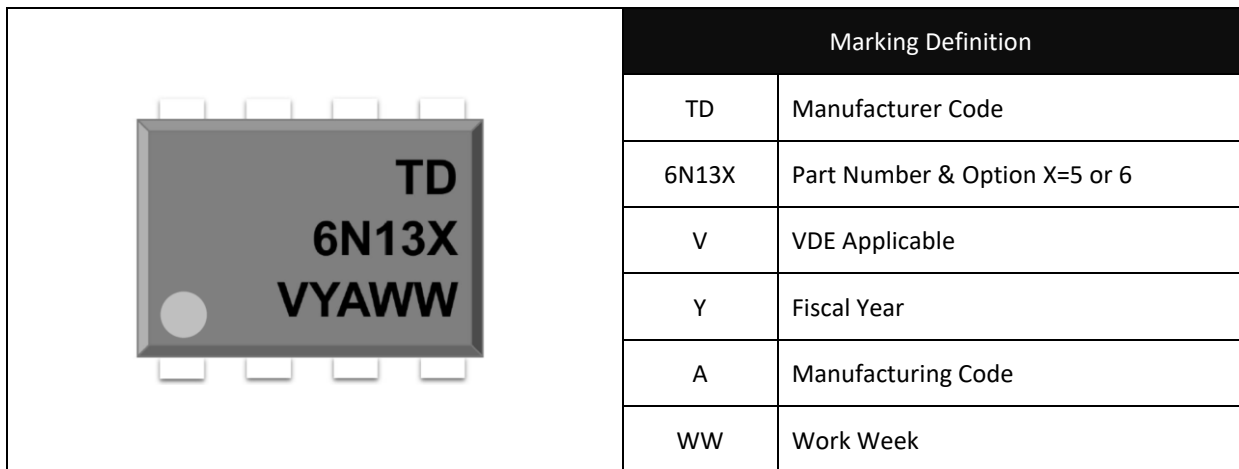
Version No.	Original Release Date
Rev: A01	09/09/2022

SCHEMATIC DIAGRAM & MARKING:

Schematic Diagram:



Marking Information:



Labelling Information:



This product is manufactured, tested, and packed by



ABSOLUTE CHARACTERISTICS:

Absolute Maximum Ratings:

Parameter	Symbol	Ratings	Unit
INPUT			
Forward Current	I_F	25	mA
Peak Forward Current	I_{FP}	50 * ¹	mA
Peak Transient Current	$I_{F(trans)}$	1 * ²	A
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
Emitter-Base Reverse Voltage	V_{EBR}	5	V
Base Current	I_B	5	mA
Output Power Dissipation	P_O	100	mW
COMMON			
Total Power Dissipation	P_{tot}	200	mW
Isolation Voltage	V_{iso}	5000 * ³	Vrms
Operating Temperature	T_{opr}	-55~+100	°C
Storage Temperature	T_{stg}	-55~+150	°C
Soldering Temperature	T_{sol}	260 * ⁴	°C

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

*2. $\leq 1\mu s$ P.W, 300pps

*3. AC for 1 minute, R.H.=40~60%

*4. for 10 seconds

ELECTRICAL CHARACTERISTICS:

Electrical Optical Characteristics:

Parameter	Symbol	Values			Unit	Test Condition	
		Min.	Typ.	Max.			
INPUT (at T _a =0 to 70°C, unless specified otherwise)							
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 (at T _a =0 to 70°C, unless specified otherwise)							
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, T _a =25°C V _O =V _{CC} =5.5V	
		---	0.01	1	μA	I _F =0mA, T _a =25°C V _O =V _{CC} =15V	
		---	---	50	μA	I _F =0mA V _O =V _{CC} =15V	
TRANSFER CHARACTERISTICS (at T _a =0 to 70°C, unless specified otherwise)							
Current Transfer Ratio	6N135	CTR	7	---	50	μA	I _F =16mA, V _O =0.4V V _{CC} =4.5V, T _a =25°C
			5	---	---		I _F =16mA, V _O =0.5V V _{CC} =4.5V
	6N136		19	---	50		I _F =16mA, V _O =0.4V V _{CC} =4.5V, T _a =25°C
			15	---	---		I _F =16mA, V _O =0.5V V _{CC} =4.5V
Logic Output Voltage	6N135	V _{OL}	---	0.18	0.4	μA	I _F =16mA V _{CC} =4.5V I _O =1.1mA T _a =25°C
			---	---	0.5		I _F =16mA V _{CC} =4.5V I _O =0.8mA
	6N136		---	0.25	0.4		I _F =16mA V _{CC} =4.5V I _O =3mA T _a =25°C
			---	---	0.5		I _F =16mA V _{CC} =4.5V I _O =2.4mA
Isolation Resistance	R _{iso}	10 ¹²	10 ¹⁴	---	Ω	DC=500V, 40 ~ 60% R.H.	
Floating Capacitance	C _{IO}	---	0.3	1	pF	V=0, f=1MHz	

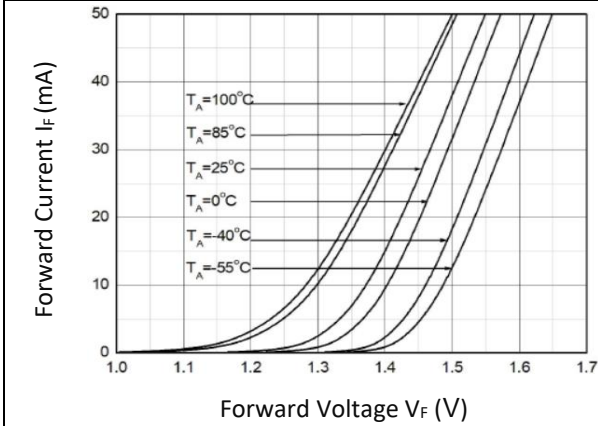
ELECTRICAL CHARACTERISTICS:

Electrical Optical Characteristics:

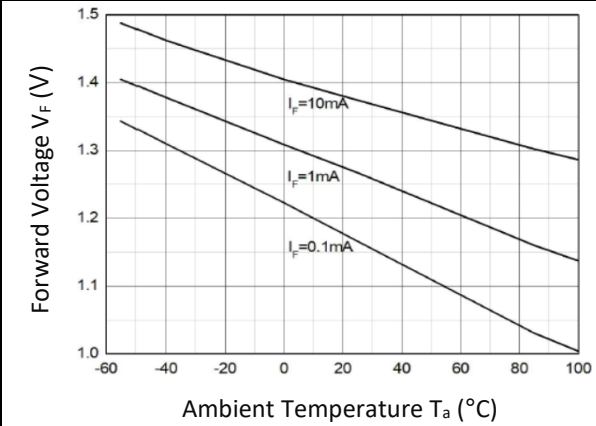
Parameter	Symbol	Values			Unit	Test Condition	
		Min.	Typ.	Max.			
SWITCHING CHARACTERISTICS (at $T_a=0$ to 70°C , $I_F=16\text{mA}$, $V_{CC}=5\text{V}$, unless specified otherwise)							
Propagation Delay Time to Logic Low	6N135	TPHL	---	0.35	1.5	μs	$R_L=4.1\text{k}\Omega$ $T_a=25^\circ\text{C}$
			---	---	2		$R_L=4.1\text{k}\Omega$
	6N136		---	0.35	0.8		$R_L=1.9\text{k}\Omega$ $T_a=25^\circ\text{C}$
			---	---	1.0		$R_L=1.9\text{k}\Omega$
Propagation Delay Time to Logic High	6N135	TPLH	---	0.5	1.5	μs	$R_L=4.1\text{k}\Omega$ $T_a=25^\circ\text{C}$
			---	---	2		$R_L=4.1\text{k}\Omega$
	6N136		---	0.3	0.8		$R_L=1.9\text{k}\Omega$ $T_a=25^\circ\text{C}$
			---	---	1.0		$R_L=1.9\text{k}\Omega$
Common Mode Transient Immunity at Logic High	6N135	CM _H	1000	---	---	$\text{V}/\mu\text{s}$	$I_F=0\text{mA}$ $V_{CM}=10\text{V}_{pp}$ $R_L=4.1\text{k}\Omega$ $T_a=25^\circ\text{C}$
	6N136		1000	---	---		$I_F=0\text{mA}$ $V_{CM}=10\text{V}_{pp}$ $R_L=1.9\text{k}\Omega$ $T_a=25^\circ\text{C}$
Common Mode Transient Immunity at Logic Low	6N135	CM _L	1000	---	---	$\text{V}/\mu\text{s}$	$I_F=16\text{mA}$ $R_L=4.1\text{k}\Omega$ $V_{CM}=10\text{V}_{pp}$ $T=25^\circ\text{C}$
	6N136		1000	---	---		$I_F=16\text{mA}$ $R_L=1.9\text{k}\Omega$ $V_{CM}=10\text{V}_{pp}$ $T=25^\circ\text{C}$

CHARACTERISTIC CURVES:

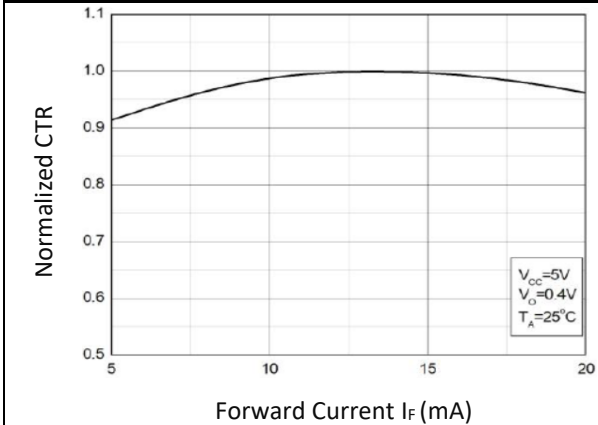
Forward Current v.s. Forward Voltage



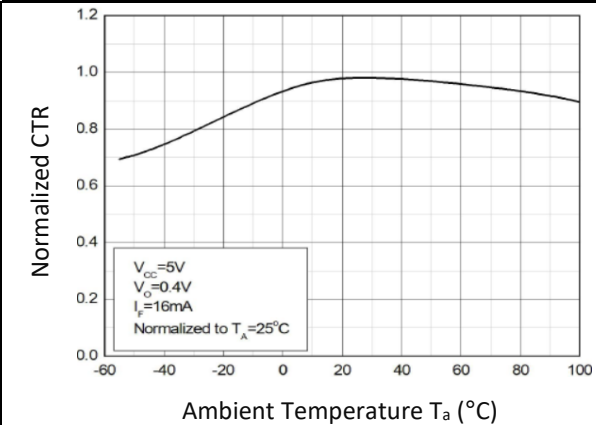
Forward Voltage v.s. Ambient Temp.



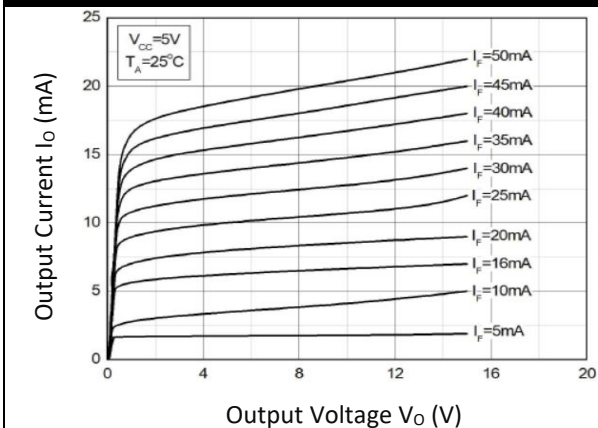
Normalized Current Transfer Ratio v.s. Forward Current



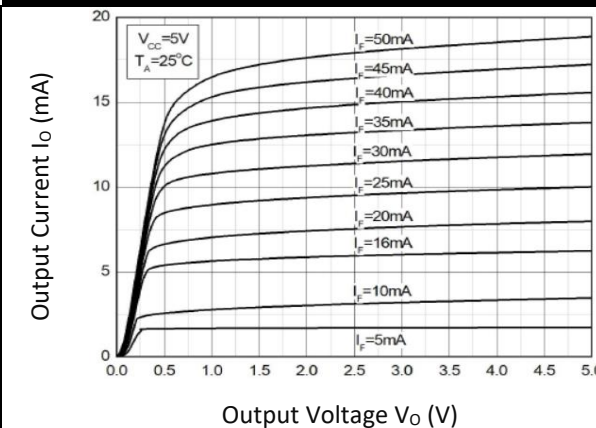
Normalized Current Transfer Ratio v.s. Ambient Temperature



Output Current v.s. Output Voltage

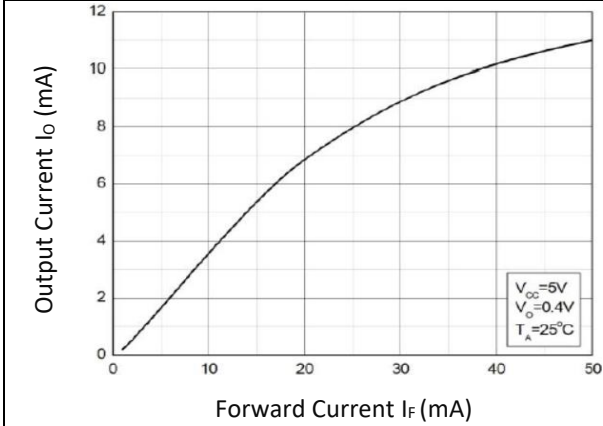


Output Current v.s. Output Voltage

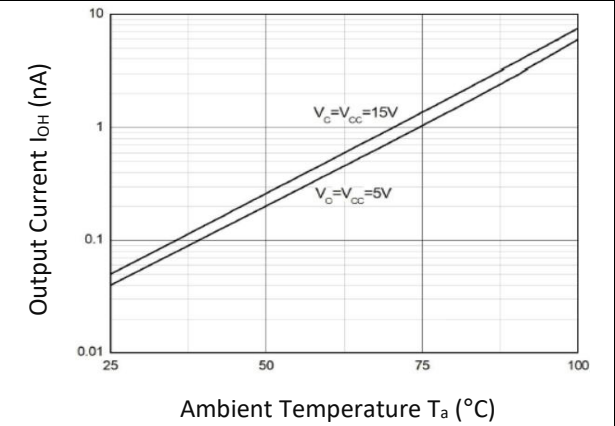


CHARACTERISTIC CURVES:

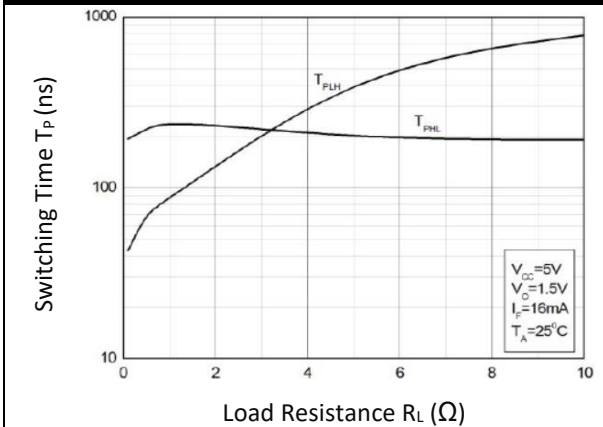
Output Current v.s. Forward Current



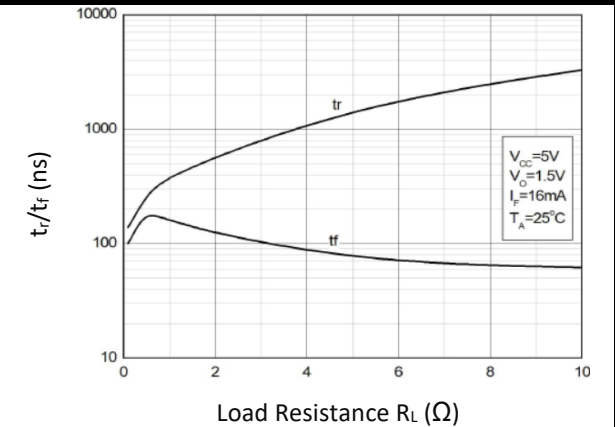
High Level Output Current v.s. Ambient Temperature



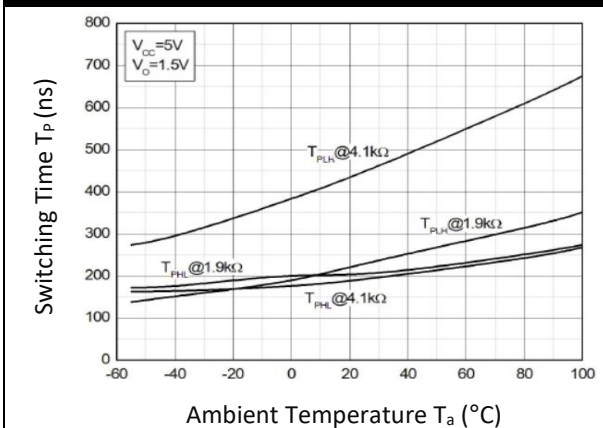
Switching Time v.s. Load Resistance



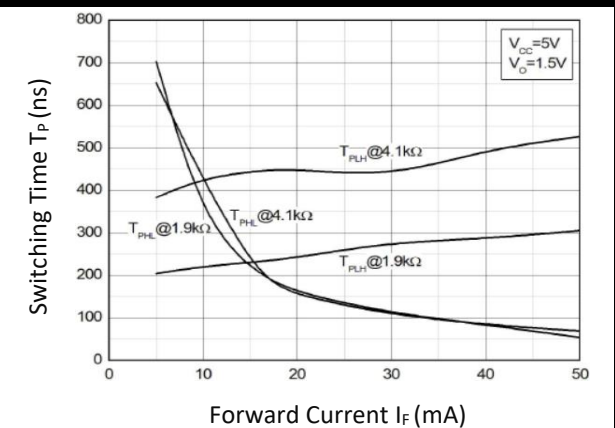
Switching Time v.s. Load Resistance



Switching Time v.s. Ambient Temperature

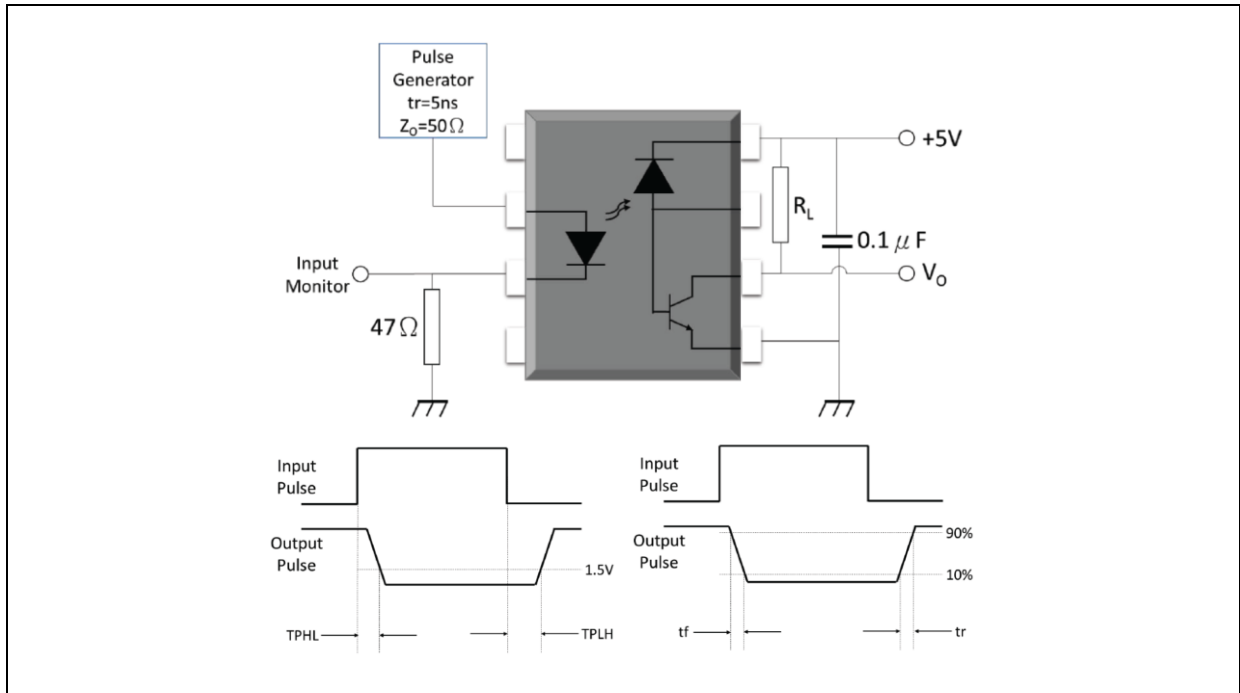


Switching Time v.s. Forward Current

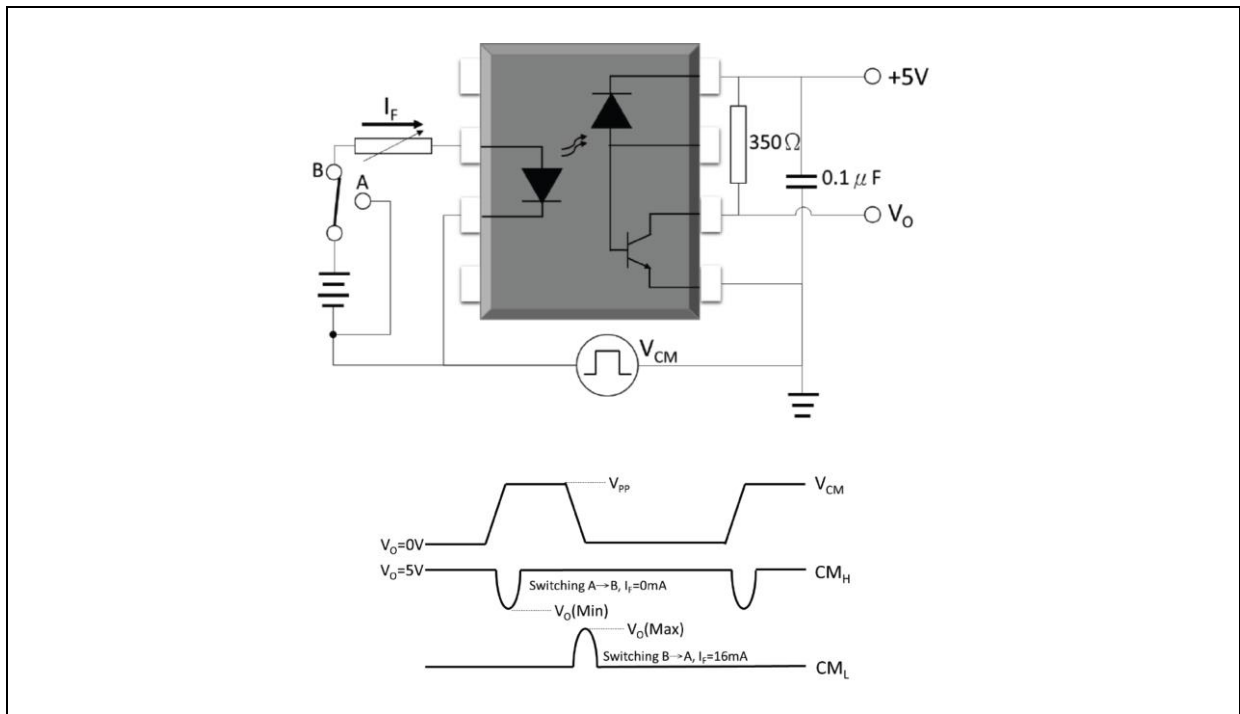


TEST CIRCUIT:

Test Circuit of TPHL, TPLH, tr, tf:

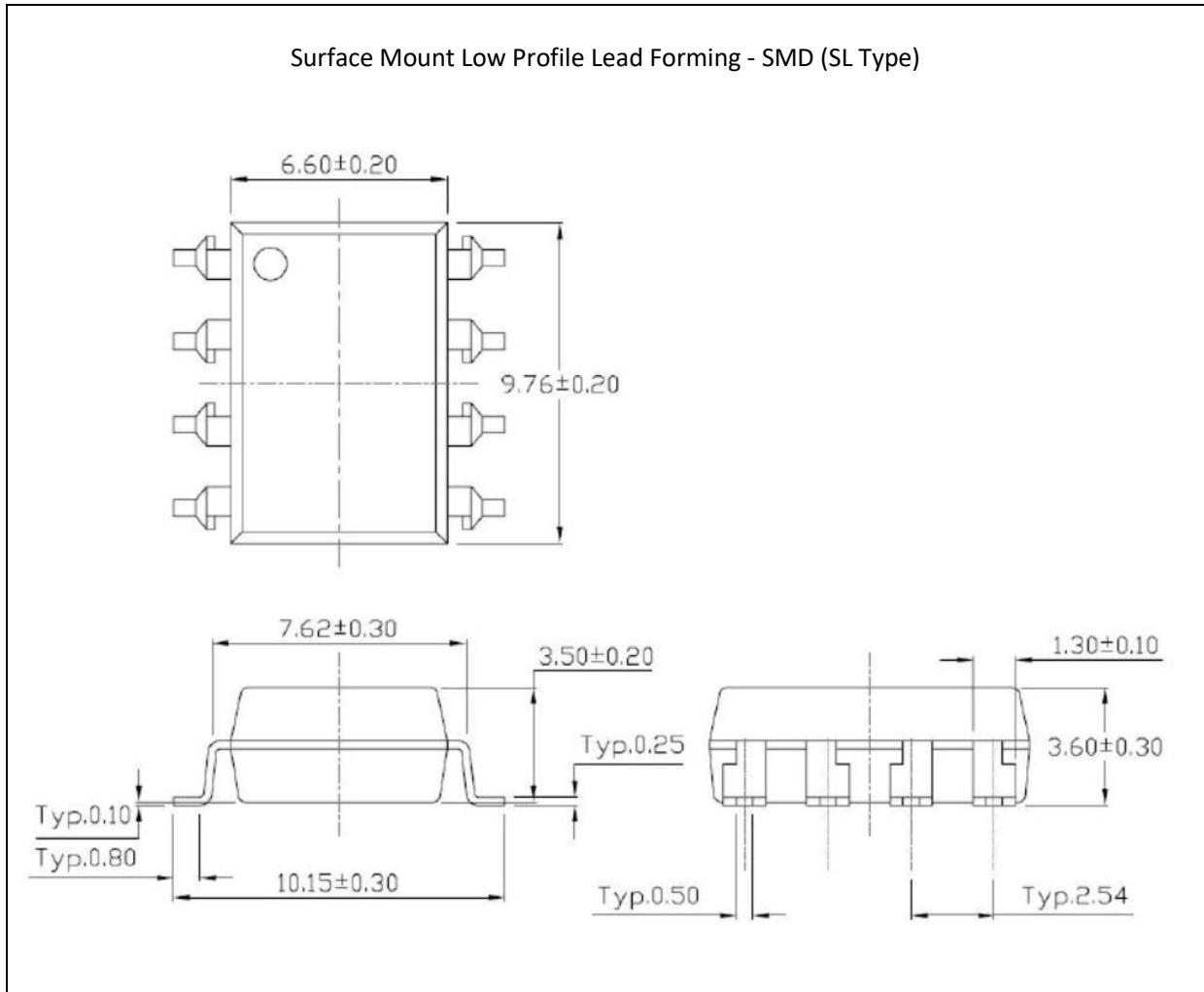


Test Circuit of Common Mode Transient Immunity:

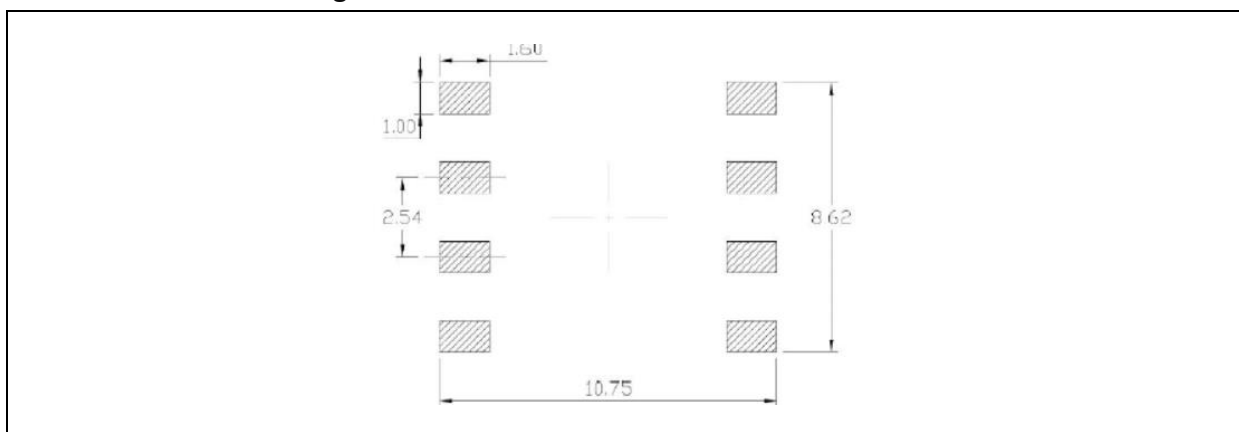


OUTLINE DIMENSION:

Package Dimension:

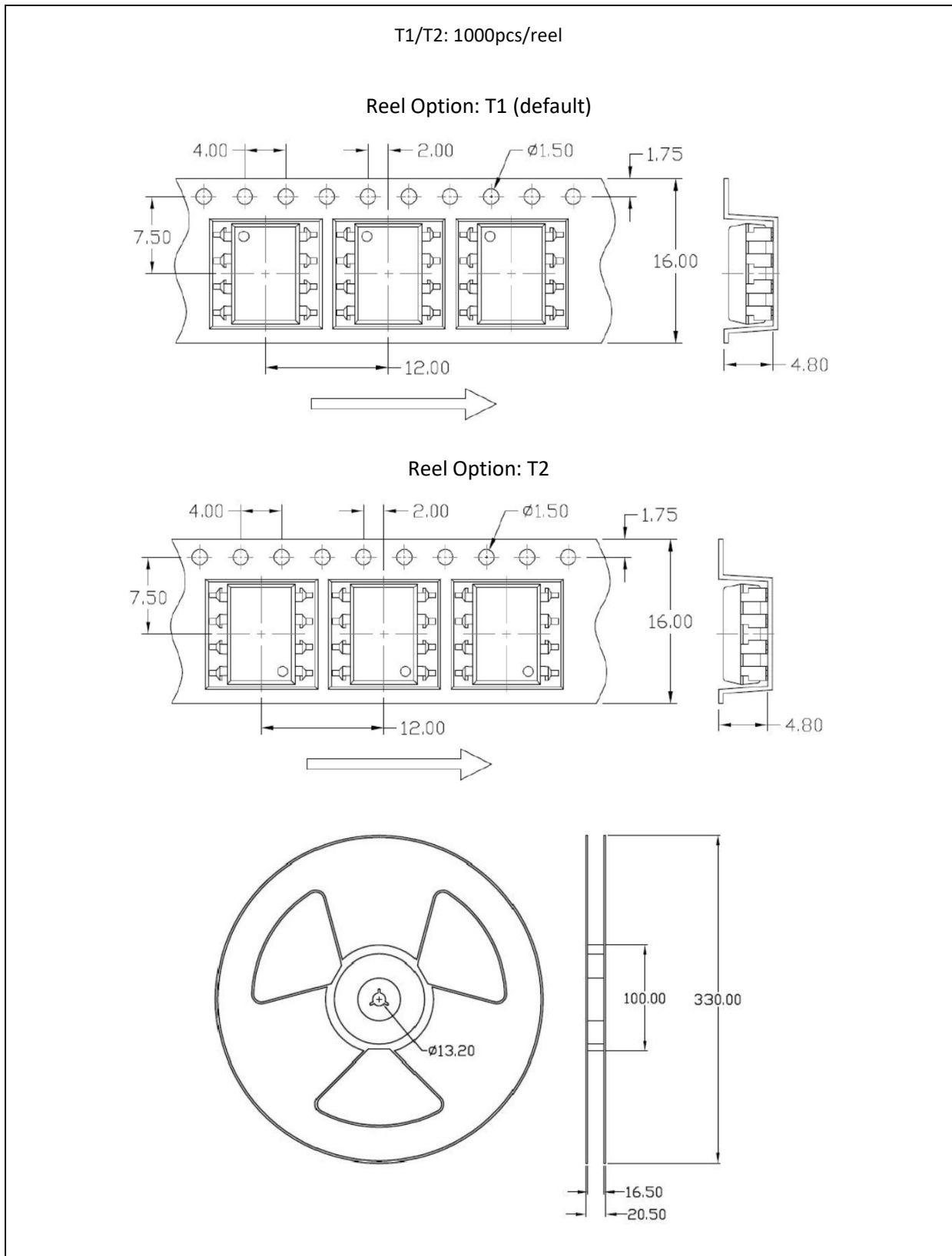


Recommended Soldering Mask:



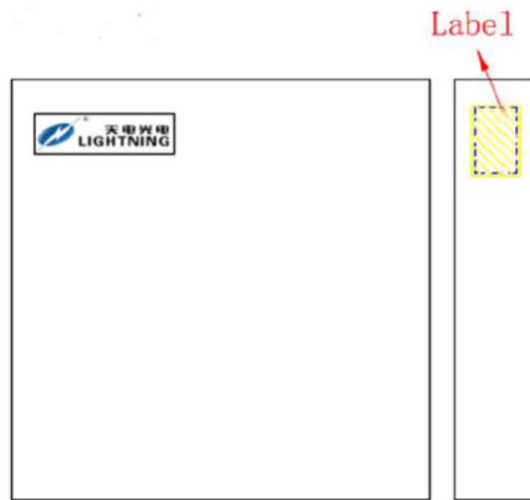
PACKING SPECIFICATION:

Reel Dimension:

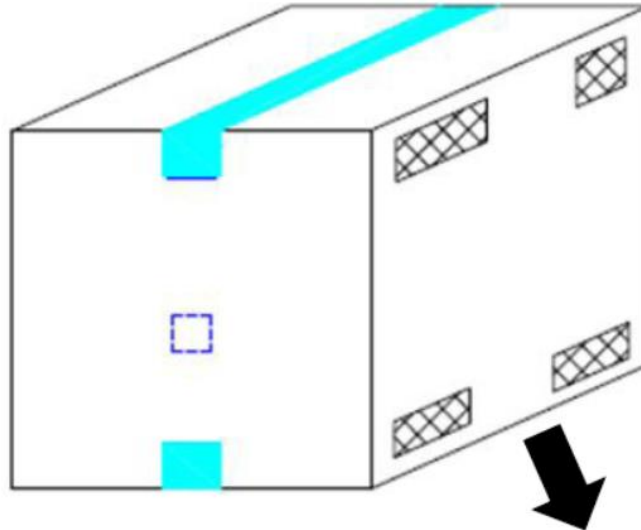


Box Dimension:

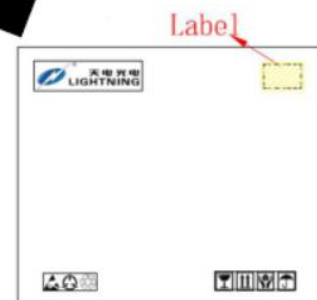
T1/T2: 3 reels (3Kpcs)/inner box, 5 inner boxes (15Kpcs)/carton



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

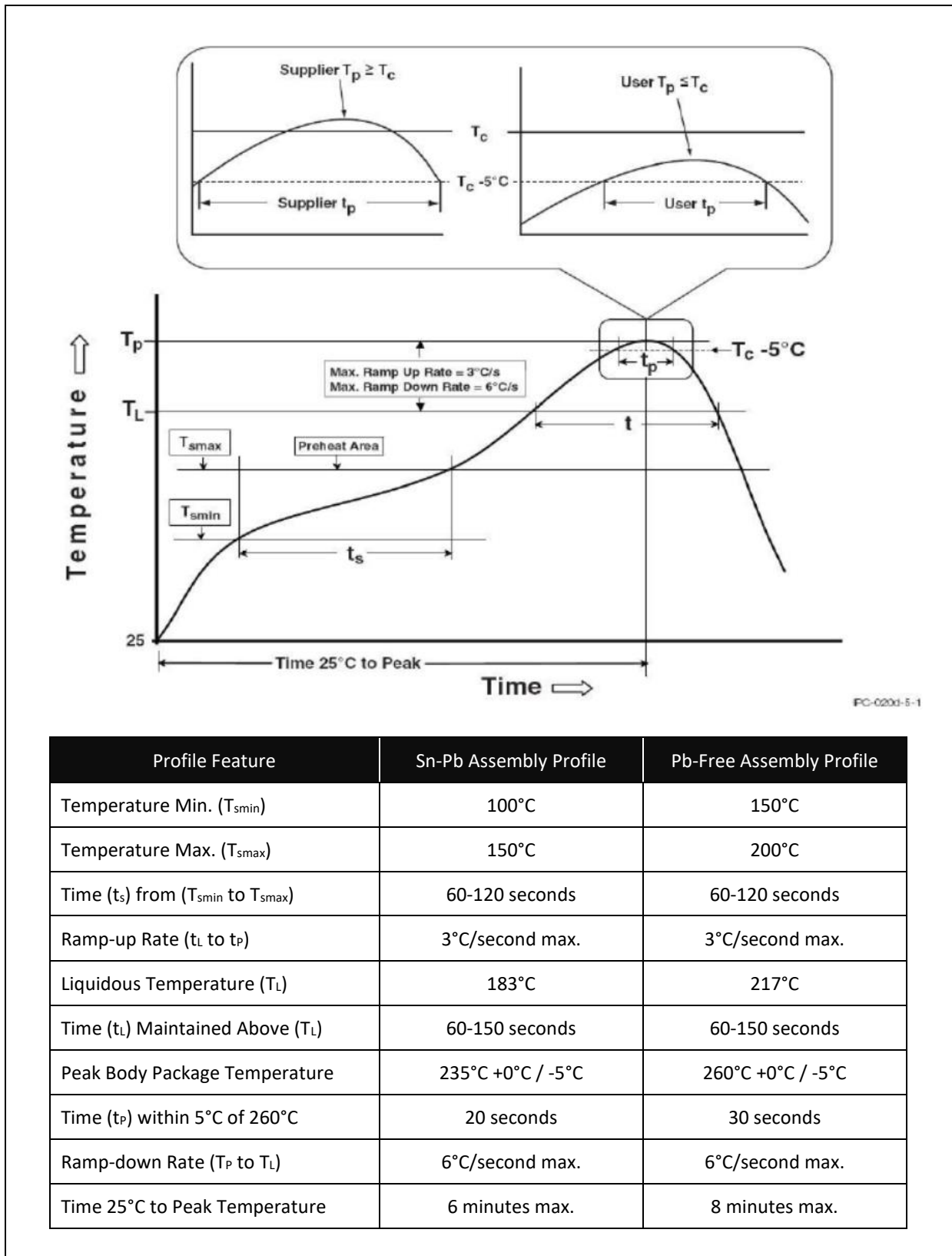


- L x W x H = 45cm x 38cm x 38cm



RECOMMENDED SOLDERING PROFILE:

Reflow Information:



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)	$3^\circ\text{C/second max.}$	$3^\circ\text{C/second max.}$
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	$235^\circ\text{C} +0^\circ\text{C} / -5^\circ\text{C}$	$260^\circ\text{C} +0^\circ\text{C} / -5^\circ\text{C}$
Time (t_p) within 5°C of 260°C	20 seconds	30 seconds
Ramp-down Rate (T_p to T_L)	$6^\circ\text{C/second max.}$	$6^\circ\text{C/second max.}$
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.