



4NXX Series

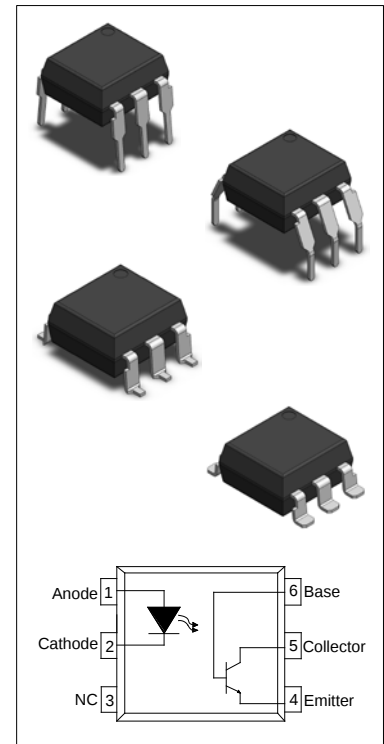
Rev.A.1.0

DESCRIPTION:

The 4NXX series combine an AlGaAs infrared emitting diode as the emitter which is optically coupled to a silicon planar phototransistor detector in a plastic DIP6 package with different lead forming options. The products are widely used in sequence controller, telephone/FAX, system appliances, measuring instrument and programmable logic controller.

MAIN FEATURES

High isolation 5000 VRMS
CTR flexibility available see order information
DC input with transistor output
Operating temperature range -55°C to 110°C
RoHS & REACH compliance
CQC approved
VDE approved
UL approved



ABSOLUTE MAXIMUM RATINGS (Temperature=25°C)

Parameter		Symbol	Value	Unit
Input	Forward current	I_F	60	mA
	Peak forward current	I_{FP}	1 ^①	A
	Reverse voltage	V_R	6	V
	Power dissipation	P_D	100	mW
Output	Collector-emitter Voltage	V_{CEO}	80	V
	Collector-base Voltage	V_{CBO}	80	V
	Emitter-collector Voltage	V_{ECO}	7	V
	Emitter- base Voltage	V_{EBO}	7	V
	Collector current	I_C	50	mA
	Output power dissipation	P_O	150	mW
Total Power Dissipation		P_{tot}	250	mW
Isolation Voltage		V_{iso}	5000 ^②	Vrms

Operating Temperature	T _{opr}	-55~+110	°C
Storage Temperature	T _{stg}	-55~+150	°C
Soldering Temperature	T _{sol}	260	°C

NOTE1 : 100μs pulse, 100Hz frequency

NOTE2 : AC for 1minute, R.H.=40~60%

ELECTRICAL CHARACTERISTICS (Temperature=25°C)

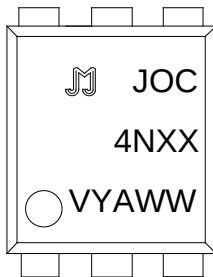
Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit
Input	Forward Voltage	V _F	I _F =10mA	-	1.27	1.4	V
			I _F =20mA	-	1.32	1.5	
	Reverse Current	I _R	V _R =6V	-	-	1	μA
	Input Capacitance	C _{in}	V=0, f=1MHz	-	30	-	pF
Output	Collector-Emitter dark current	I _{CEO}	V _{CE} =20V, I _F =0	-	-	100	nA
	Collector-Emitter breakdown voltage	BV _{CEO}	I _C =0.1mA I _F =0	80	-	-	V
	Collector-Base breakdown voltage	BV _{CBO}	I _C =0.1mA I _F =0	80	-	-	V
	Emitter-Collector breakdown voltage	BV _{ECO}	I _E =0.1mA I _F =0	7	-	-	V
	Emitter-Base breakdown voltage	BV _{EBO}	I _E =0.1mA I _F =0	7	-	-	V
Transfer Characteristics	DC Forward current gain	h _{FE}	V _{CE} =5V, I _C =0.5mA	100	-	600	-
	Current transfer ratio	CTR ^①	I _F =10mA V _{CE} =10V	10	-	-	%
	Collector-Emitter Saturation Voltage	V _{CE(sat)}	4N25,4N26, 4N27,4N28 I _F =10mA V _{CE} =10V	-	-	0.5	V
			4N35,4N36, 4N37 I _F =10mA I _C =0.5mA	-	-	0.3	
			4N38 I _F =10mA I _C =4mA	-	-	1.0	
			4N25,4N26, 4N27,4N28 I _F =10mA I _C =2mA	-	-	0.5	
	Isolation resistance	R _{IO}	DC500V 40~60%R. H.	10 ¹²	10 ¹⁴	-	Ω
	Floating Capacitance	C _{IO}	V=0, f=1MHz	-	0.5	1	pF

	Cut-off Frequency	f_c	$V_{CE}=5V$, $I_C=2mA$ $R_L=100\Omega$, -3dB	-	6	-	kHz
	Rise Time	t_r	$V_{CC}=10V$, $I_C=2mA$ $R_L=100\Omega$	-	2.5	10	μs
	Fall Time	t_f		-	3	10	μs
	Response Time	t_{on}		-	5	15	μs
		t_{off}		-	4	15	μs

NOTE1 : Rank Table of Current Transfer Ratio (Temperature=25°C)

Grade Sign	Min. (%)	Max. (%)
4N35,4N36,4N37	100	-
4N25,4N26,4N38	20	-
4N27,4N28	10	-

ORDERING AND MARKING INFORMATION

MARKING INFORMATION			
		JOC : Company Abbr. 4NXX : Part Number & Rank V : VDE Option Y : Fiscal Year A : Manufacturing Code WW : Work Week	
ORDERING INFORMATION			
4NXX(Y)(Z)-GV			
4NXX –Part Number & Rank (XX=25/26/27/28/35/36/37/38) Y – Lead Form Option (M/S/SL/None) Z – Tape and Reel Option (T1/T2) G – Material Option (G: Green, None: Non-Green) V – VDE Option (V or None)			
Packing Quantity			
Option	Quantity	Quantity – Inner box	Quantity –Outer box
None/M	65 Units/Tube	32 Tubes/Inner box	10 Inner box/Outer box =20.8k Units
S(T1/T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box =15k Units
SL(T1/T2)	1000 Units/Reel	3 Reels/Inner box	5 Inner box/Outer box =15k Units

Characteristics Curves

FIG.1: Forward Current vs. Ambient Temperature

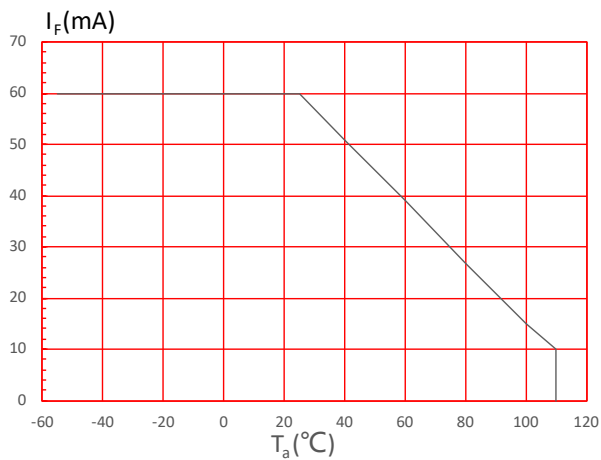


FIG.2: Collector Power Dissipation vs. Ambient Temperature

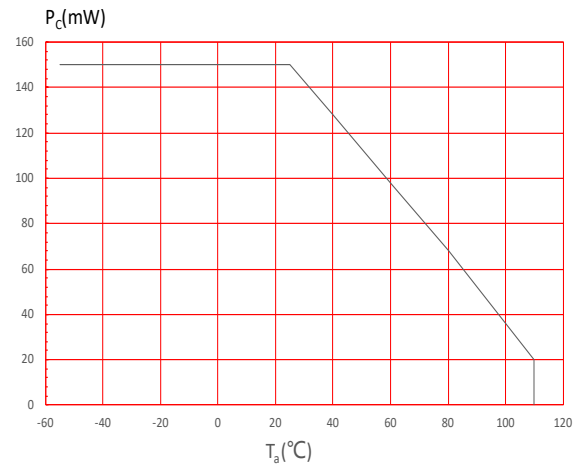


FIG.3: Forward Current vs. Forward Voltage

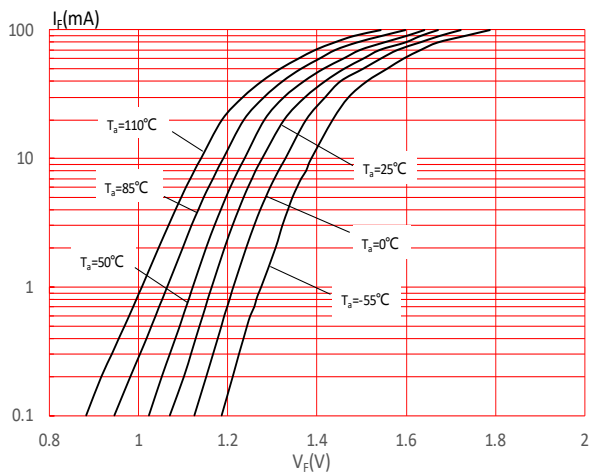


FIG.4: Normalized Collector Dark Current vs. Ambient Temperature

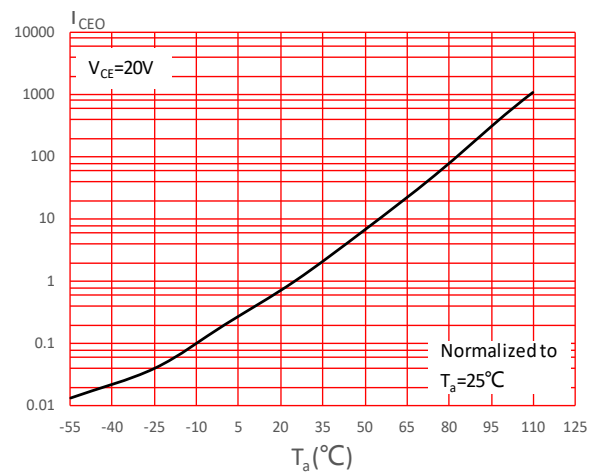


FIG.5: Collector Current vs. Collector-emitter Voltage

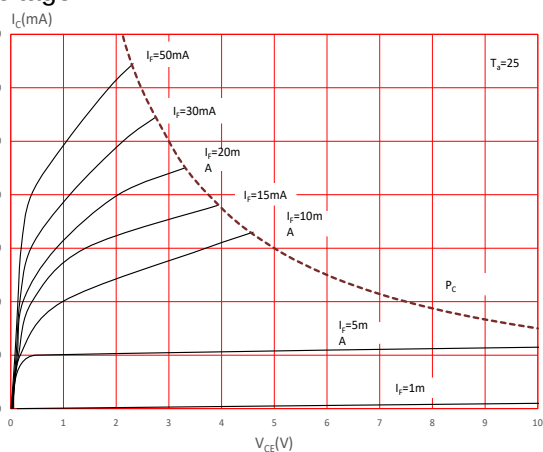


FIG.6: Normalized Current Transfer Ratio vs. Forward Current

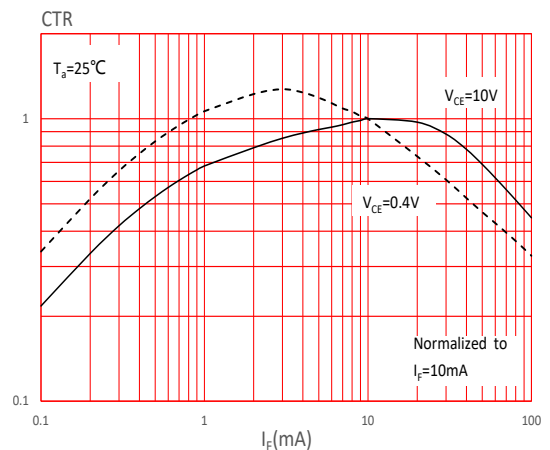


FIG.7: Normalized Current Transfer Ratio vs. Ambient Temperature

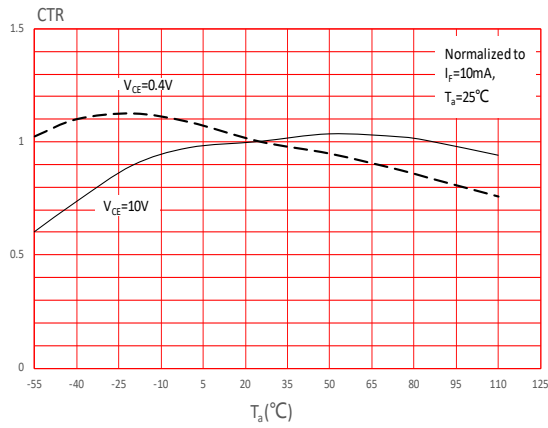


FIG.8: Normalized Collector-emitter Saturation Voltage vs. Ambient Temperature

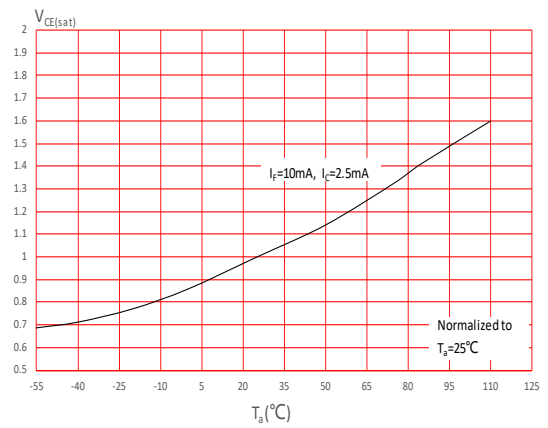


FIG.9: Current Transfer Ratio (Unsaturated) vs. Base-Emitter Resistance

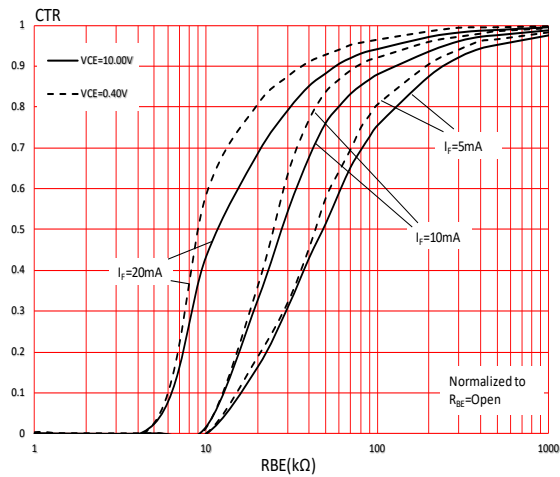


FIG.10: Response Time vs. Load Resistance

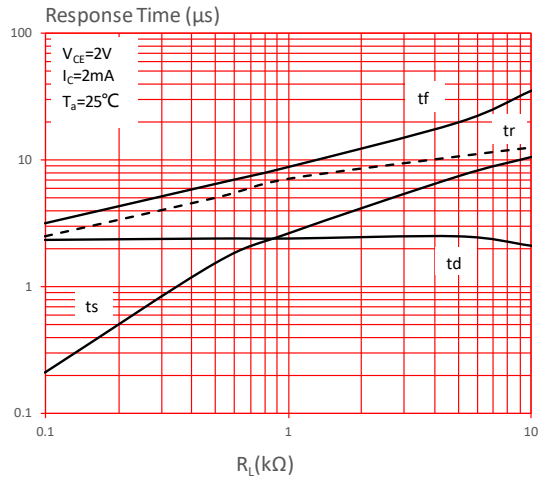


FIG.11: Frequency Response

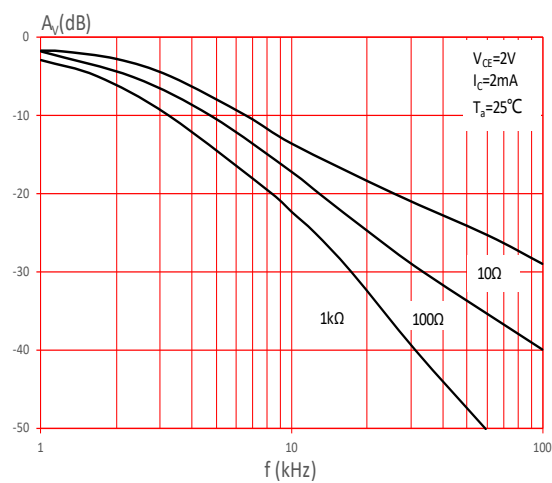
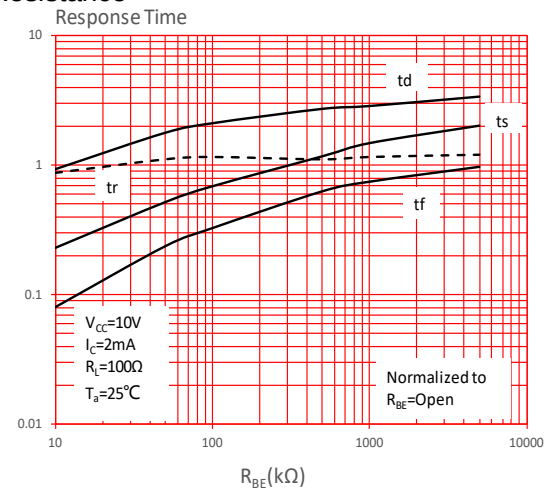
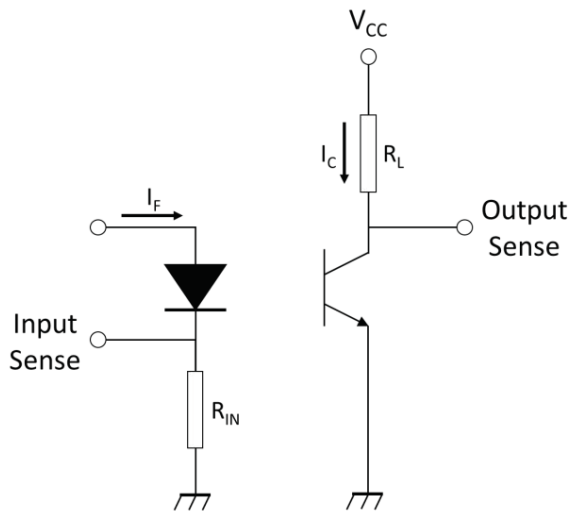
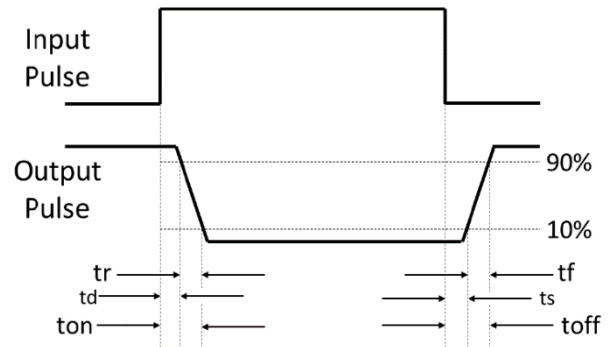
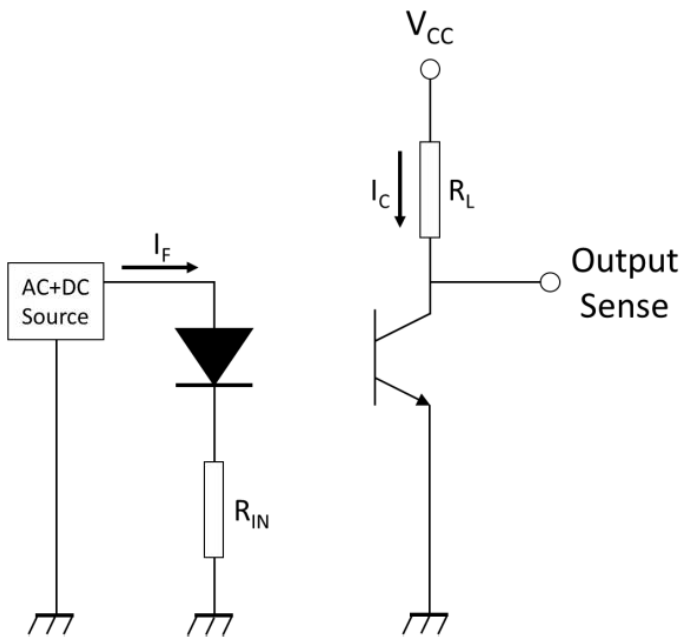


FIG.12: Response Time vs. Base-Emitter Resistance

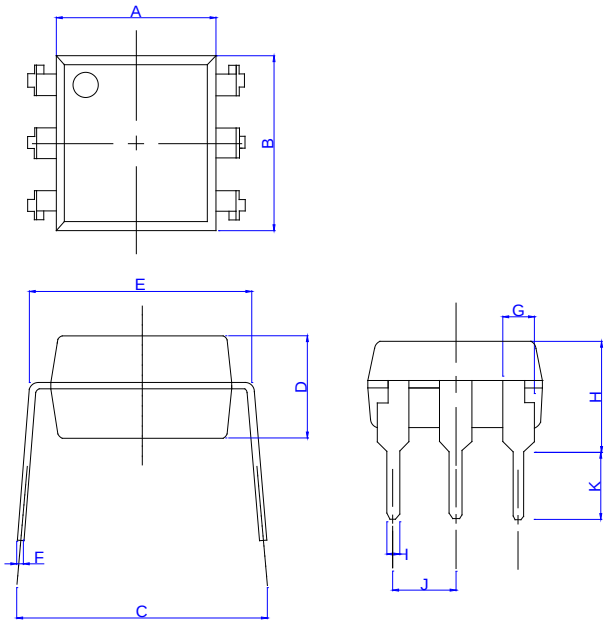


Test Circuits

FIG.13: Test Circuits of Response Time

FIG.14: Curves of Response Time

FIG.15: Test Circuits of Frequency Response


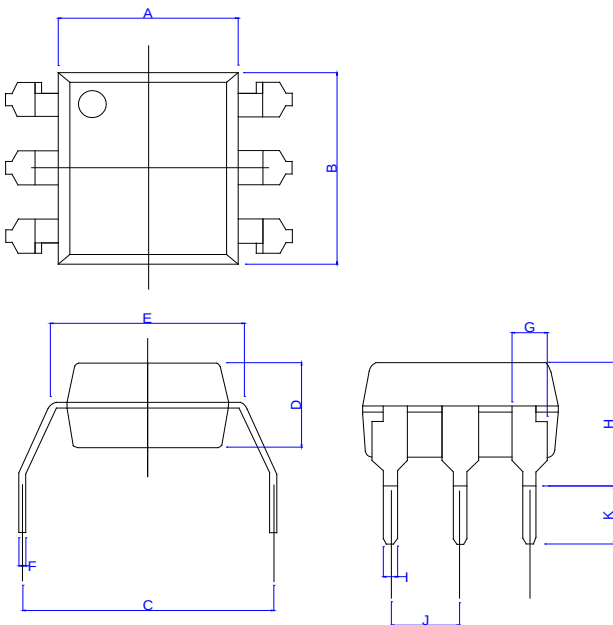
Package Dimension (Unit: mm)

Standard DIP Type:



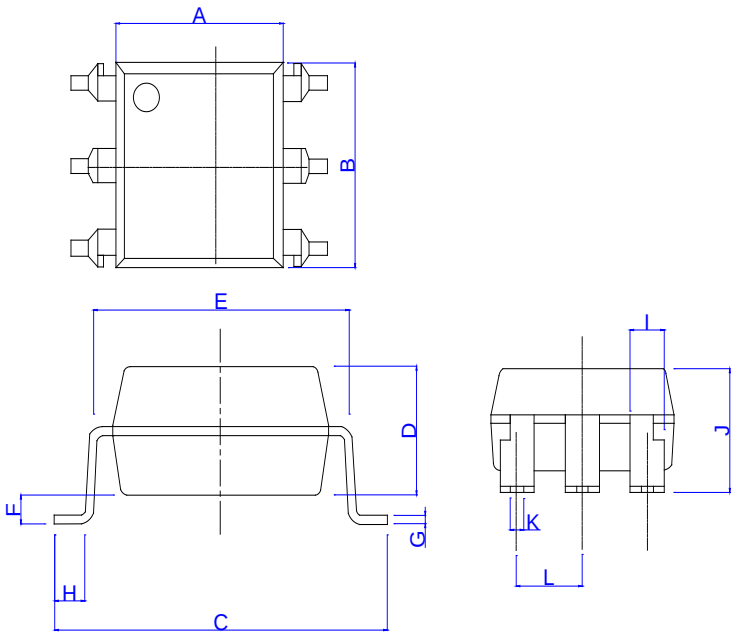
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.00		7.00	0.237		0.277
B	6.62		7.62	0.262		0.301
C	7.10		10.16	0.281		0.402
D	3.00		4.00	0.119		0.158
E	7.32		7.92	0.289		0.313
F	0.16		0.36	0.006		0.014
G	0.90		1.50	0.036		0.059
H	3.50		4.80	0.138		0.190
I	0.40		0.60	0.016		0.024
J	2.29		2.79	0.091		0.110
K	2.40		3.40	0.095		0.134

Option M Type:



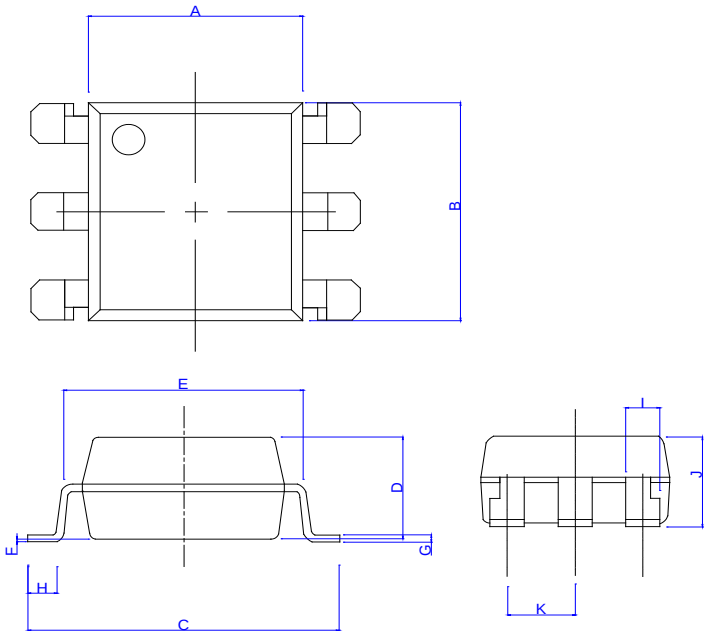
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.00		7.00	0.237		0.277
B	6.82		7.42	0.270		0.293
C	9.66		10.66	0.382		0.421
D	3.00		4.00	0.119		0.158
E	7.32		7.92	0.289		0.313
F	0.16		0.36	0.006		0.014
G	0.90		1.50	0.036		0.059
H	4.28		4.88	0.169		0.193
I	0.40		0.60	0.016		0.024
J	2.29		2.79	0.091		0.110
K	2.00		2.60	0.079		0.103

Option S Type:



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.30		6.70	0.249		0.265
B	6.92		7.32	0.274		0.289
C	9.85		10.45	0.389		0.413
D	3.30		3.70	0.130		0.146
E	7.32		7.92	0.289		0.313
F		0.80			0.032	
G		0.25			0.010	
H		0.80			0.032	
I	1.20		1.40	0.047		0.055
J	4.00		4.60	0.158		0.182
K		0.50			0.020	
L		2.54			0.100	

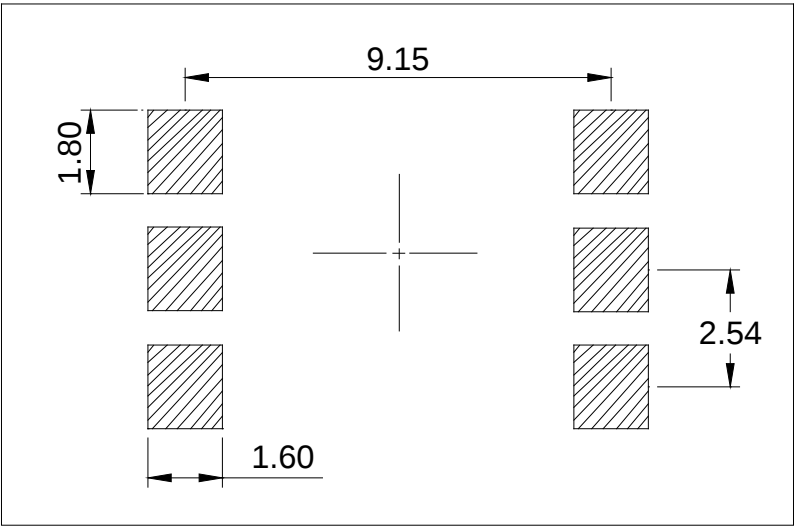
Option SL Type:



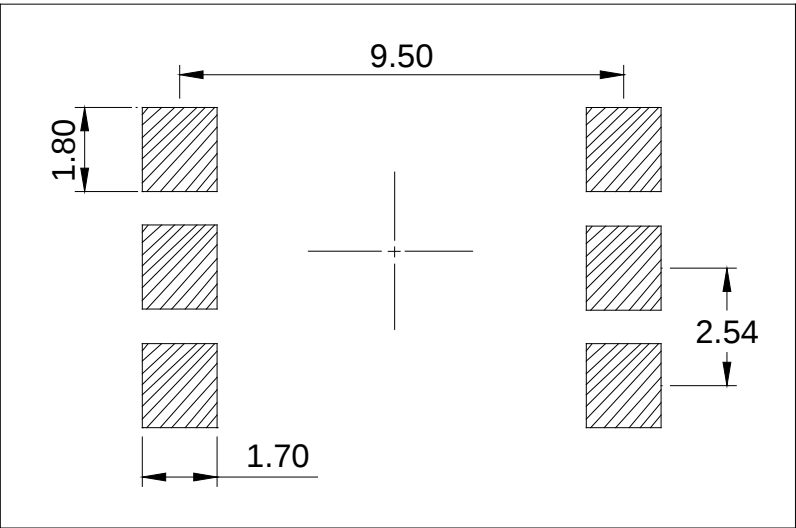
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	6.00		7.00	0.237		0.277
B	6.62		7.62	0.262		0.301
C	9.50		10.45	0.375		0.413
D	3.00		4.00	0.119		0.158
E	7.32		7.92	0.289		0.313
F	0.00		0.65	0.000		0.026
G	0.16		0.36	0.006		0.014
H	0.60		1.40	0.024		0.055
I	0.90		1.50	0.036		0.059
J	3.30		4.35	0.130		0.172
K	0.40		0.60	0.016		0.024
L	2.29		2.79	0.091		0.110

RECOMMENDED SOLDER MASK (Dimensions in mm unless otherwise stated)

Option S

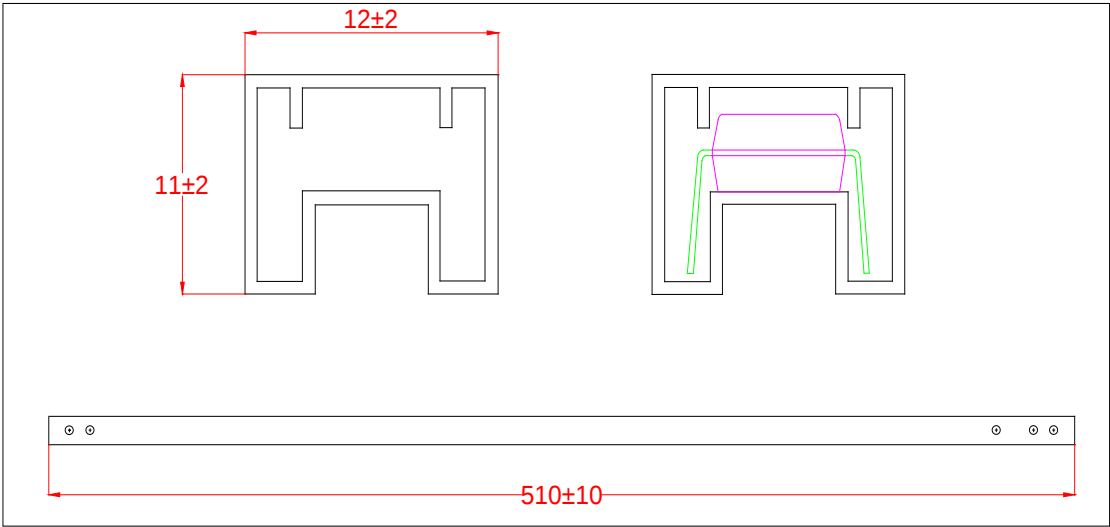


Option SL

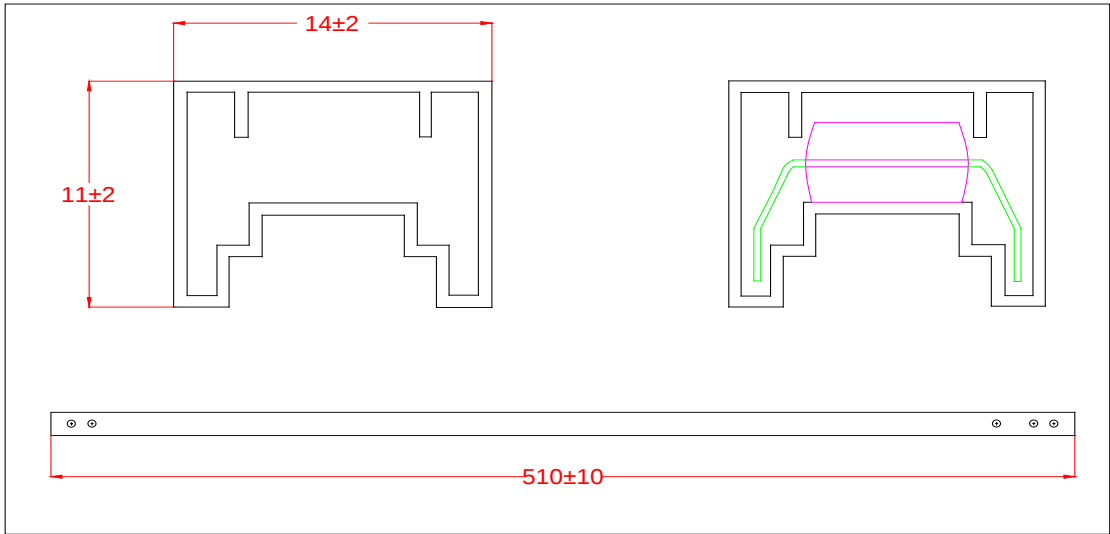


TUBE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Standard DIP

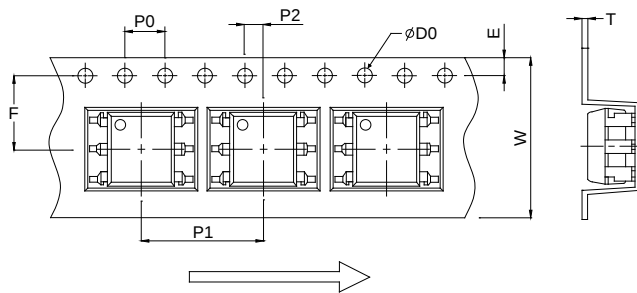


Option M

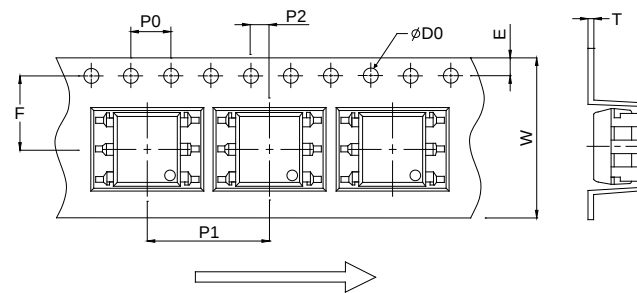


CARRIER TAPE SPECIFICATIONS (Dimensions in mm unless otherwise stated)

Option S(T1)

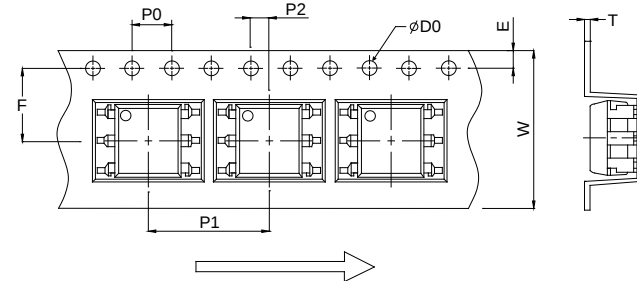


Option S(T2)

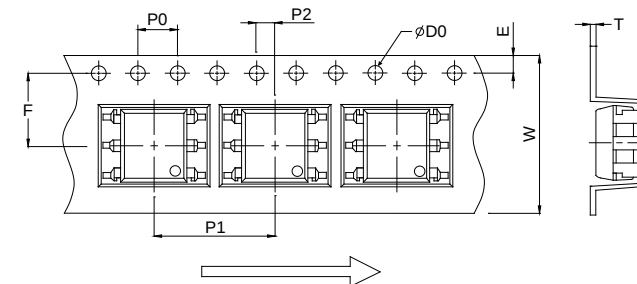


Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D0		1.50	1.65		0.059	0.065
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	11.90	12.00	12.10	0.469	0.472	0.476
P2	1.90	2.00	2.10	0.075	0.079	0.083
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
T	0.25	0.35	0.45	0.010	0.014	0.018
W	15.70	16.00	16.30	0.618	0.630	0.642

Option SL(T1)

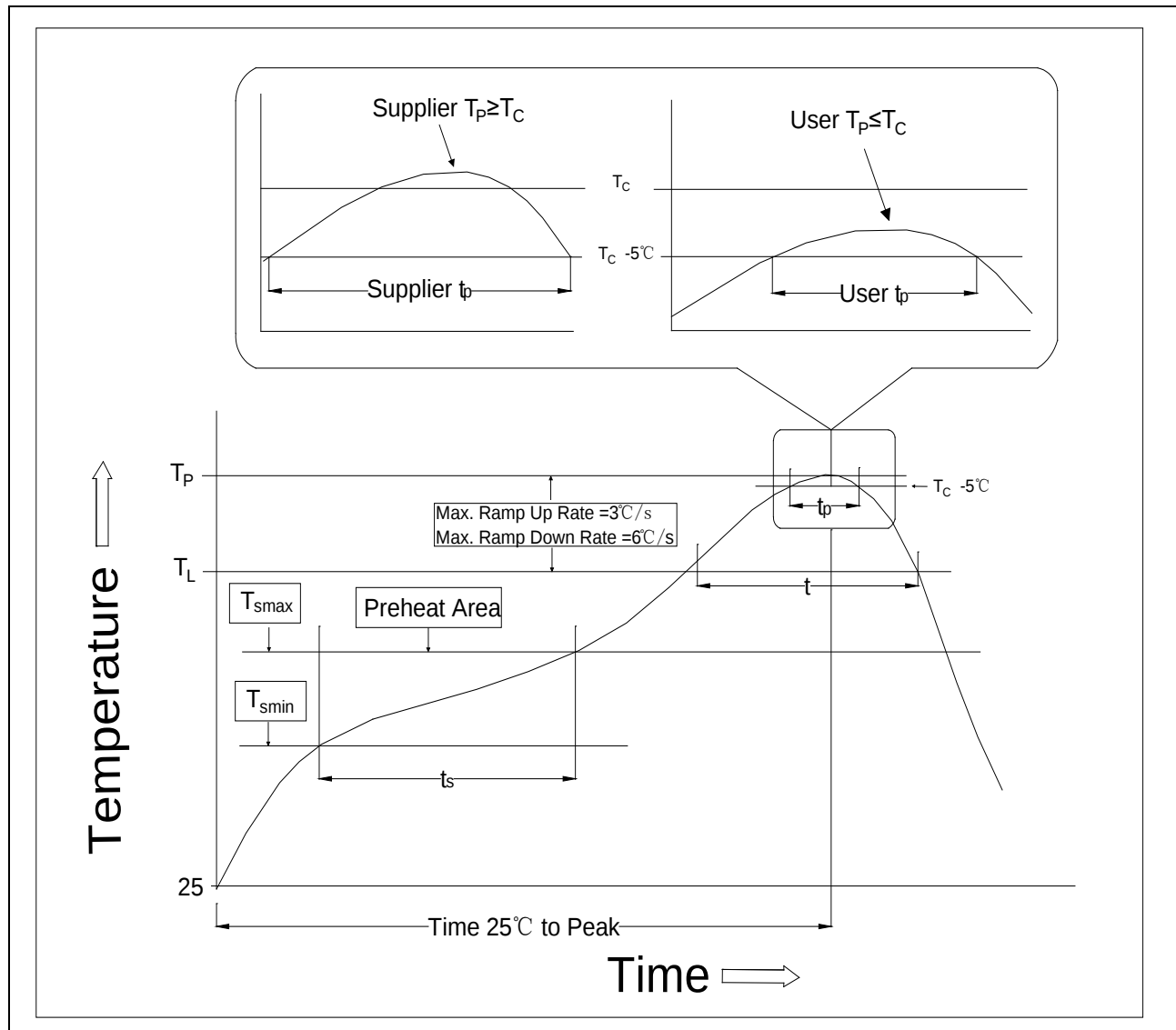


Option SL(T2)



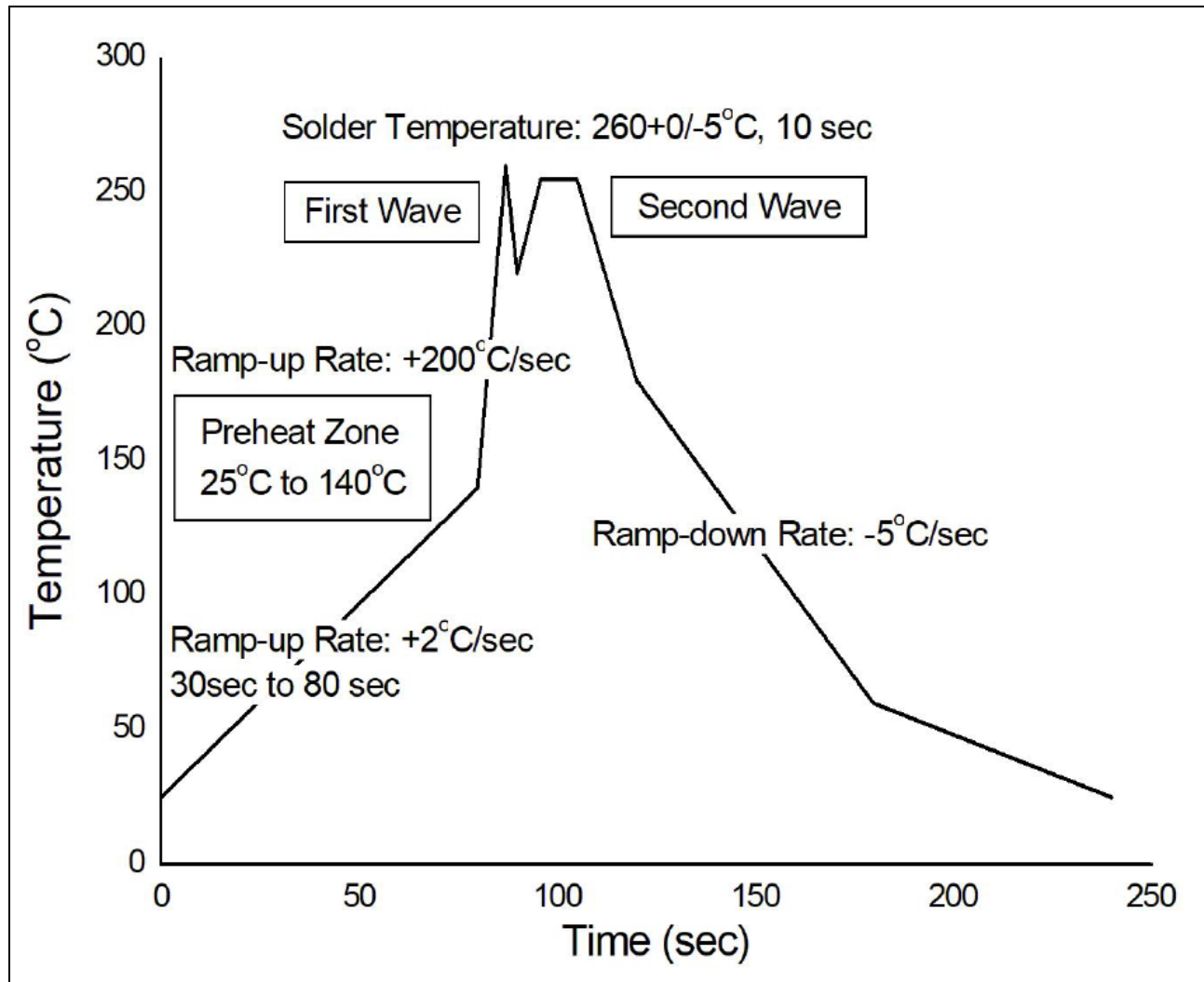
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
D0		1.50	1.60		0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	11.90	12.00	12.10	0.469	0.472	0.476
P2	1.90	2.00	2.10	0.075	0.079	0.083
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
T	0.35	0.40	0.45	0.014	0.016	0.018
W	15.70	16.00	16.30	0.618	0.630	0.642

REFLOW INFORMATION



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.
Liquidus 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.

WAVE SOLDERING



HAND SOLDERING BY SOLDERING IRON

Soldering Temperature	360±5°C
Soldering Time	3s max.

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