20V N-CHANNEL Enhancement Mode MOSFET

MTN2302N3

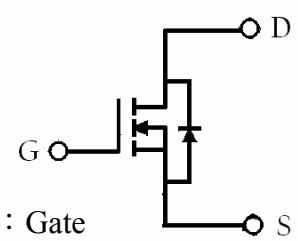
BV_{DSS}	20V
I_D	3.6A
$R_{DSON(MAX)}$@V_{GS}=4.5V, I_D=3.6A	29mΩ(typ.)
$R_{DSON(MAX)}$@V_{GS}=2.5V, I_D=3.1A	39mΩ(typ.)

Features

- Simple drive requirement
- Small package outline
- Capable of 2.5V gate drive
- Pb-free lead plating and halogen-free package

Symbol

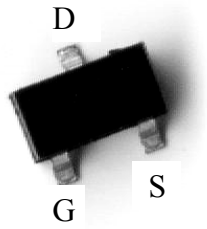
MTN2302N3



G：Gate
S：Source
D：Drain

Outline

SOT-23



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current @V_{GS}=4.5V, T_A=25°C (Note 3)	I_D	3.6	A
Continuous Drain Current @V_{GS}=4.5V, T_A=70°C (Note 3)		2.9	A
Pulsed Drain Current (Notes 1, 2)	I_{DM}	10	A
Maximum Power Dissipation@ T_A=25℃	P_D	1.38 (Note 3)	W
Linear Derating Factor		0.01	W/°C
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150	°C

Note : 1. Pulse width limited by maximum junction temperature.
2. Pulse width≤ 300μs, duty cycle≤2%.
3. Surface mounted on 1 in² copper pad of FR-4 board, t≤5s; 270°C/W when mounted on minimum copper pad.

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient, max	$R_{\theta JA}$	90	°C/W
Thermal Resistance, Junction-to-Case, max	$R_{\theta JC}$	80	°C/W

Note : Surface mounted on 1 in² copper pad of FR-4 board, t≤5s; 270°C/W when mounted on minimum copper pad.

Electrical Characteristics (Tj=25°C, unless otherwise noted)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	20	-	-	V	V_{GS}=0, I_D=250μA
$\Delta BV_{DSS}/\Delta Tj$	-	0.1	-	V/°C	Reference to 25°C, I_D=1mA
$V_{GS(th)}$	0.5	0.7	1.2	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±12V, V_{DS}=0
I_{DSS}	-	-	1	μA	V_{DS}=20V, V_{GS}=0
	-	-	10	μA	V_{DS}=20V, V_{GS}=0 (Tj=70°C)
*$R_{DS(ON)}$	-	29	55	mΩ	I_D=3.6A, V_{GS}=4.5V
	-	39	70		I_D=3.1A, V_{GS}=2.5V
*G_{FS}	-	7.5	-	S	V_{DS}=5V, I_D=3.6A
Dynamic					
Ciss	-	440	-	pF	V_{DS}=10V, V_{GS}=0, f=1MHz
Coss	-	61	-		
Crss	-	59	-		
$t_{d(ON)}$	-	4.5	-	ns	V_{DS}=10V, I_D=3.6A, V_{GS}=5V R_G=6Ω, R_D=2.8Ω
t_r	-	7.4	-		
$t_{d(OFF)}$	-	19	-		
t_f	-	7.2	-		
Qg	-	4.4	-	nC	V_{DS}=10V, I_D=3.6A, V_{GS}=4.5V
Qgs	-	0.7	-		
Qgd	-	1.7	-		
Source-Drain Diode					
*V_{SD}	-	0.8	1.2	V	V_{GS}=0V, I_S=1.6A
I_S	-	-	1	A	V_D=V_G=0V, V_S=1.2V
I_{SM}	-	-	10		

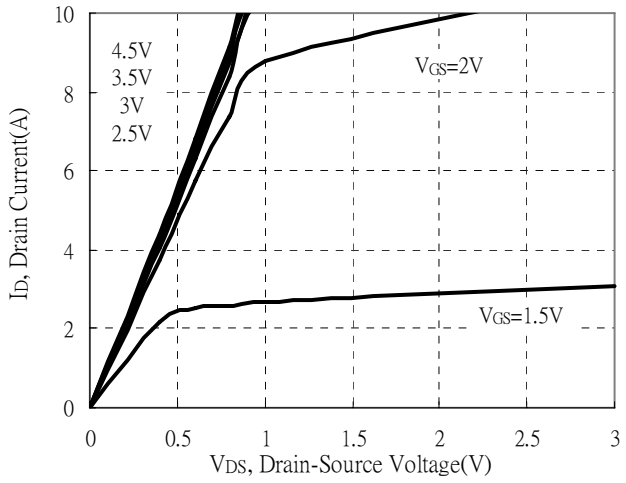
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Ordering Information

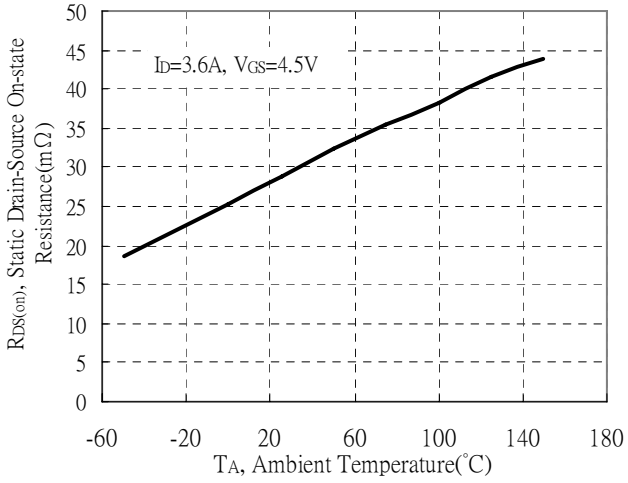
Device	Package	Shipping
MTN2302N3-0-T1-G	SOT-23 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

Typical Characteristics

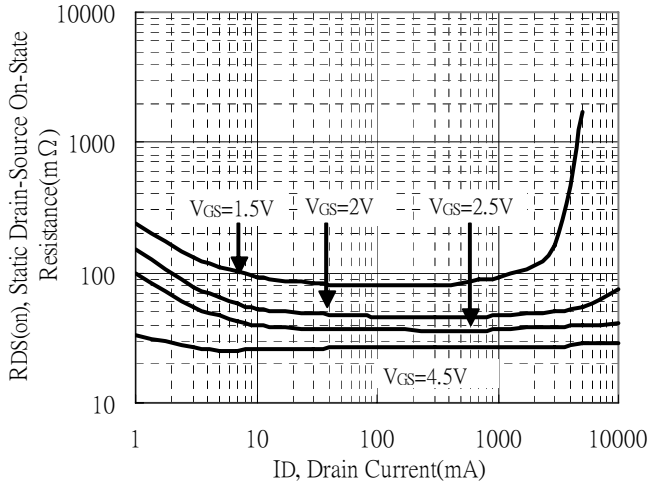
Typical Output Characteristics



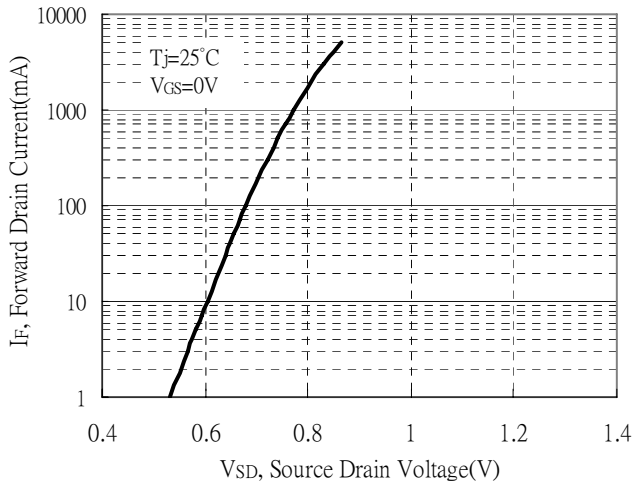
Static Drain-Source On-resistance vs Ambient Temperature



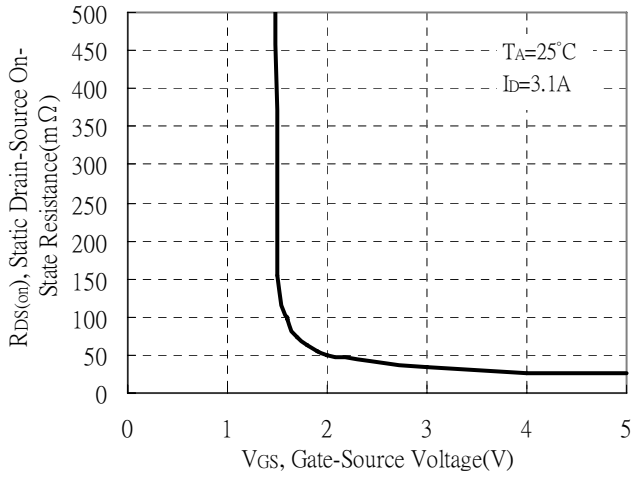
Static Drain-Source On-State resistance vs Drain Current



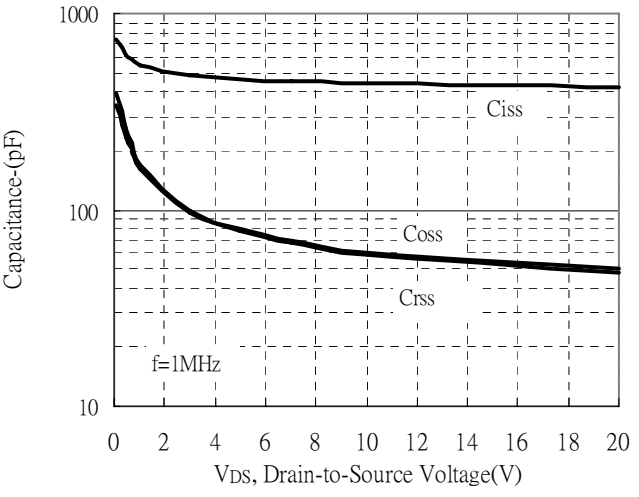
Forward Drain Current vs Source-Drain Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage

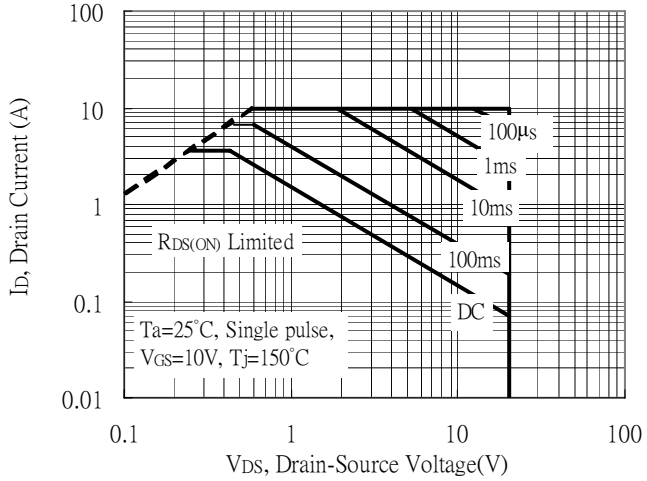


Capacitance vs Reverse Voltage

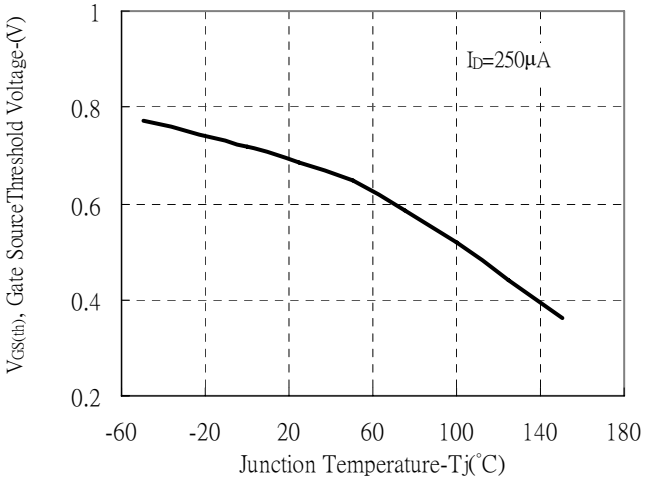


Typical Characteristics(Cont.)

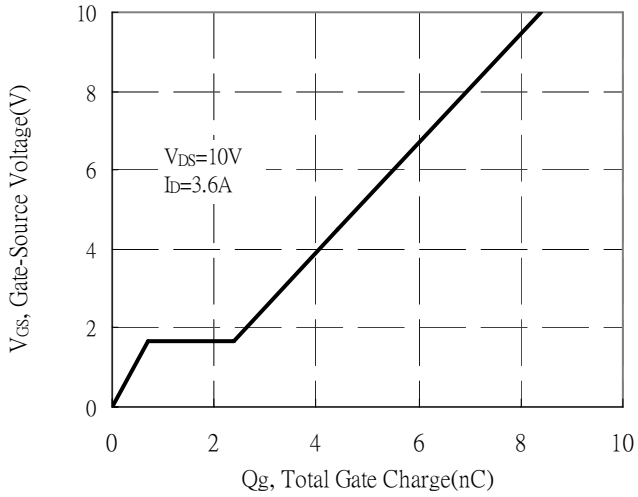
Maximum Safe Operating Area



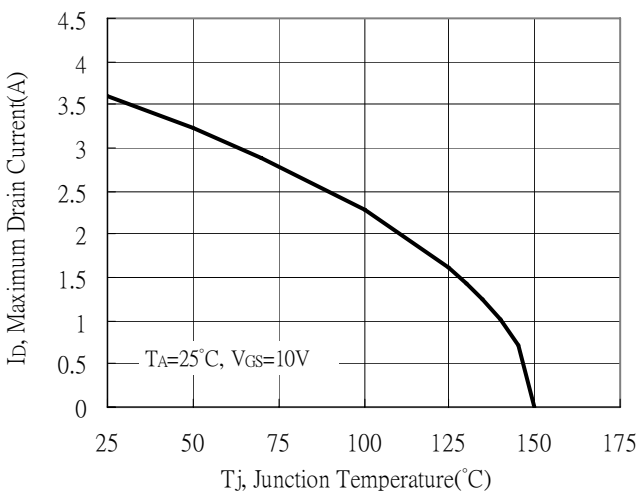
Gate Threshold Voltage vs Ambient Temperature



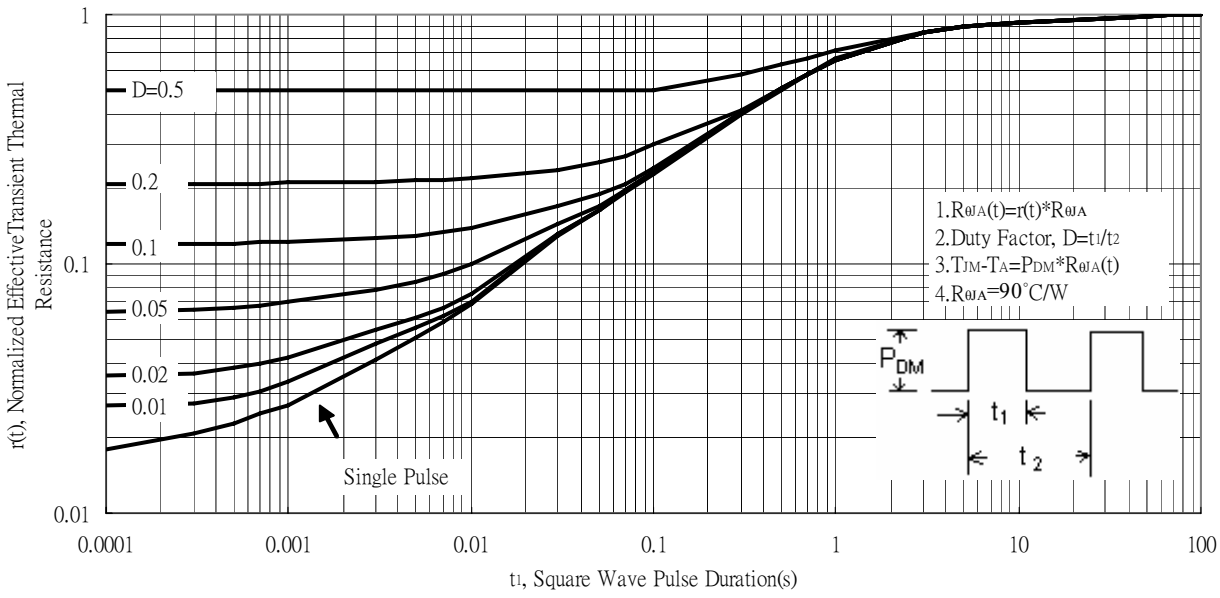
Gate Charge Characteristics



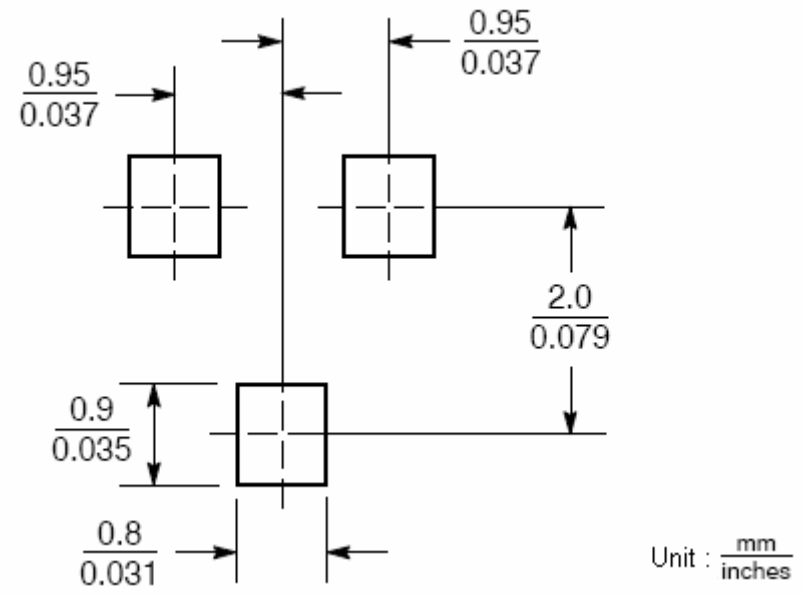
Maximum Drain Current vs Junction Temperature



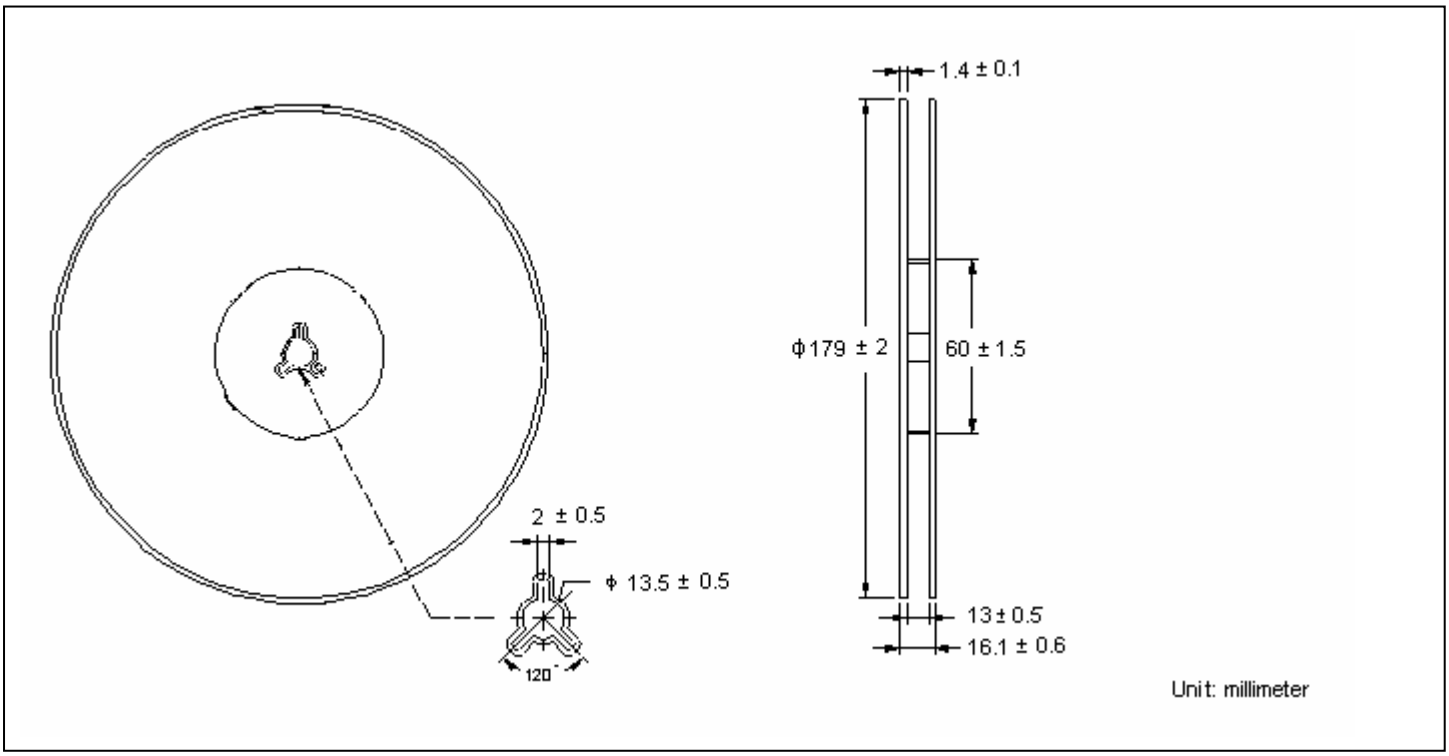
Transient Thermal Response Curves



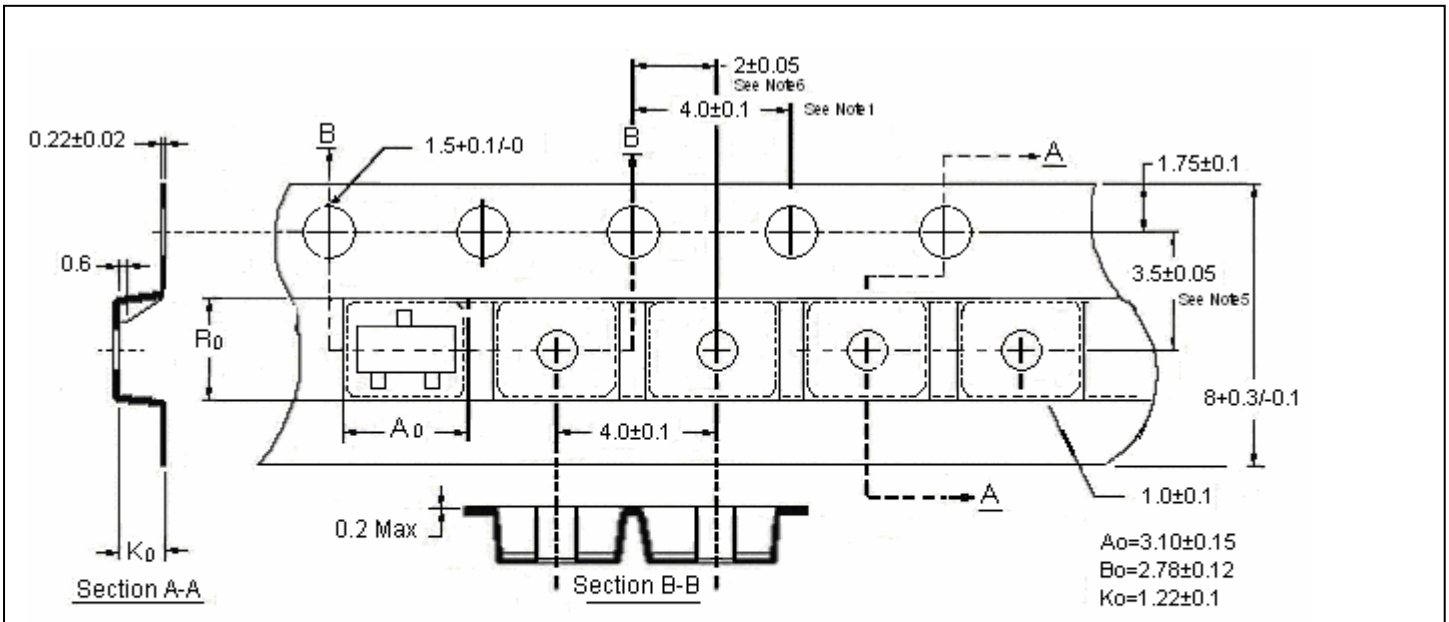
Recommended Soldering Footprint



Reel Dimension



Carrier Tape Dimension



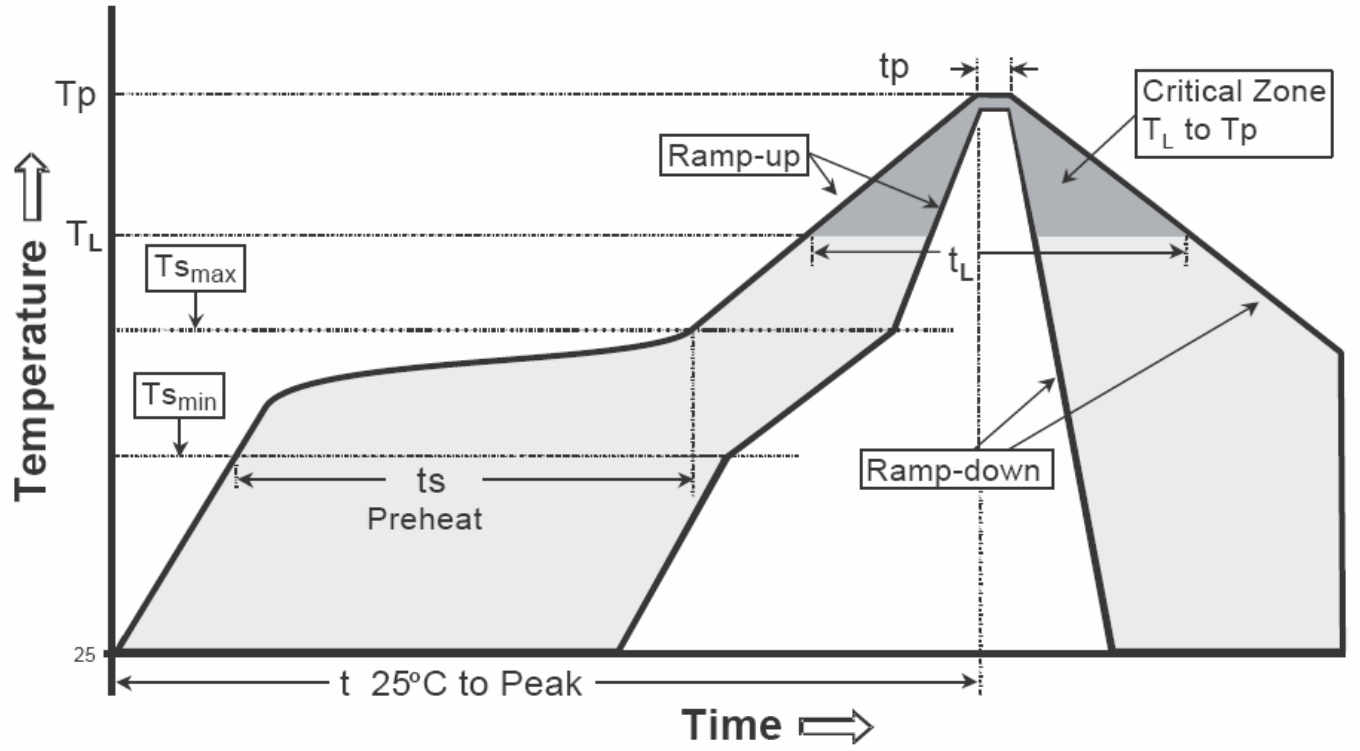
Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material : conductive Black Polystyrene.
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Unit : millimeter

Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

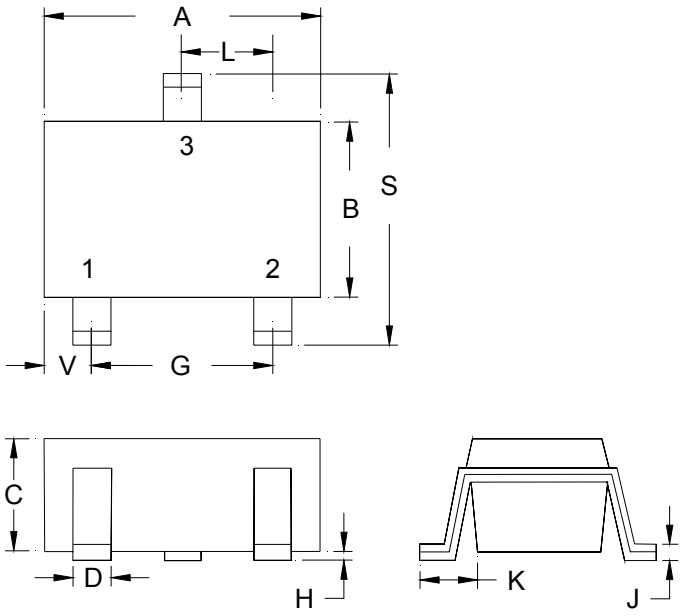
Recommended temperature profile for IR reflow



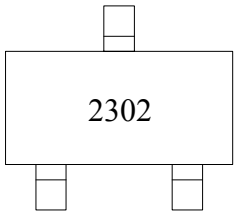
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (T_L) − Time (t_L)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature(T_P)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

SOT-23 Dimension



Marking:



3-Lead SOT-23 Plastic
Surface Mounted Package
CYStek Package Code: N3

Style: Pin 1.Gate 2.Source 3.Drain

*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1102	0.1204	2.80	3.04	J	0.0032	0.0079	0.08	0.20
B	0.0472	0.0669	1.20	1.70	K	0.0118	0.0266	0.30	0.67
C	0.0335	0.0512	0.89	1.30	L	0.0335	0.0453	0.85	1.15
D	0.0118	0.0197	0.30	0.50	S	0.0830	0.1161	2.10	2.95
G	0.0669	0.0910	1.70	2.30	V	0.0098	0.0256	0.25	0.65
H	0.0000	0.0040	0.00	0.10					

Notes: 1.Controlling dimension: millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.

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