30V N-CHANNEL Enhancement Mode MOSFET

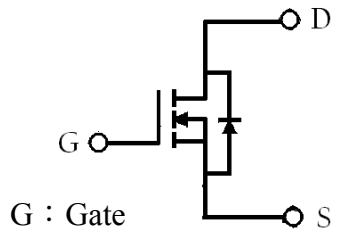
Features

- Simple drive requirement
- Small package outline
- Pb-free lead plating and halogen-free package

BV_{DSS}		30V
I_D@V_{GS}=10V		5A
$R_{DSON(TYP)}$	V_{GS}=10V, I_D=5A	20mΩ
	V_{GS}=4.5V, I_D=4A	28mΩ

Symbol

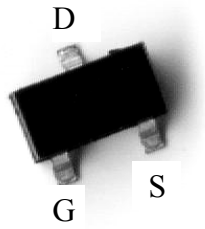
MTN2304N3



G：Gate
S：Source
D：Drain

Outline

SOT-23



Ordering Information

Device	Package	Shipping
MTN2304N3-0-T1-G	SOT-23 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T1 : 3000 pcs / tape & reel,7” reel

Product rank, zero for no rank products

Product name

Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current @ T_A=25°C , V_{GS}=10V		I_D	5	A
Continuous Drain Current @ T_A=70°C, V_{GS}=10V			4	
Pulsed Drain Current (Notes 1, 2)		I_{DM}	20	
Maximum Power Dissipation (Note 3)	T_A=25°C	P_D	1.38	W
	T_A=70°C		0.83	
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.

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient(PCB mounted)	Rth,ja	90	°C/W

Note : Surface mounted on 1 in² copper pad of FR-4 board; 270°C/W when mounted on minimum copper pad

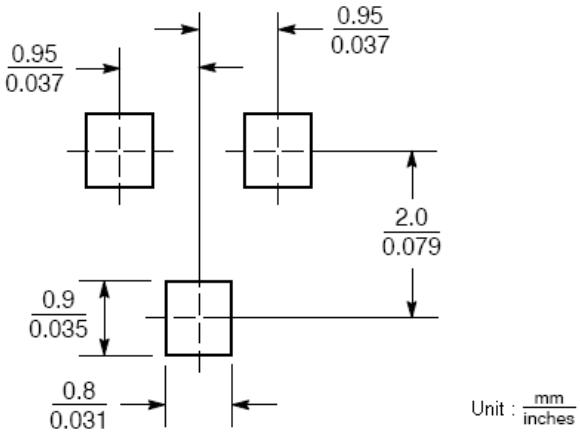
Electrical Characteristics (Tj=25°C, unless otherwise noted)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	30	-	-	V	V_{GS}=0, I_D=250μA
$V_{GS(th)}$	1.3	1.6	2.5	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0
I_{DSS}	-	-	1	μA	V_{DS}=24V, V_{GS}=0
	-	-	10	μA	V_{DS}=24V, V_{GS}=0 ,Tj=70°C
*$R_{DS(ON)}$	-	20	28	mΩ	I_D=5A, V_{GS}=10V
	-	28	40		I_D=4A, V_{GS}=4.5V
*G_{FS}	-	6	-	S	V_{DS}=10V, I_D=4A
Dynamic					
Ciss	-	800	-	pF	V_{DS}=15V, V_{GS}=0, f=1MHz
Coss	-	70	-		
Crss	-	71	-		
$t_{d(ON)}$	-	6	-	ns	V_{DS}=15V, I_D=1A, V_{GS}=10V R_G=6Ω, R_D=15Ω
t_r	-	10	-		
$t_{d(OFF)}$	-	24	-		
t_f	-	5	-		
Qg	-	16	-	nC	V_{DS}=15V, I_D=5A, V_{GS}=10V
Qgs	-	3	-		
Qgd	-	5	-		

Source-Drain Diode					
*V_{SD}	-	-	1.3	V	V_{GS}=0V, I_S=1.5A
I_S	-	-	5	A	V_D=V_G=0V, V_S=1.2V
I_{SM}	-	-	20		
trr	-	29	-	ns	I_F=5A, dI_F/dt=100A/μs
Qrr	-	10	-	nC	

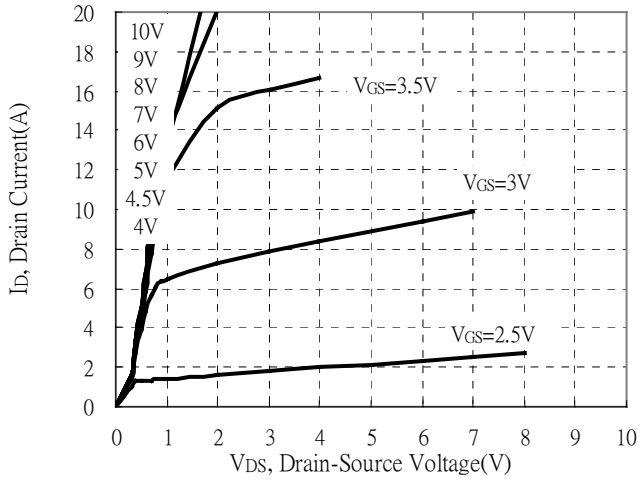
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Recommended Soldering Footprint

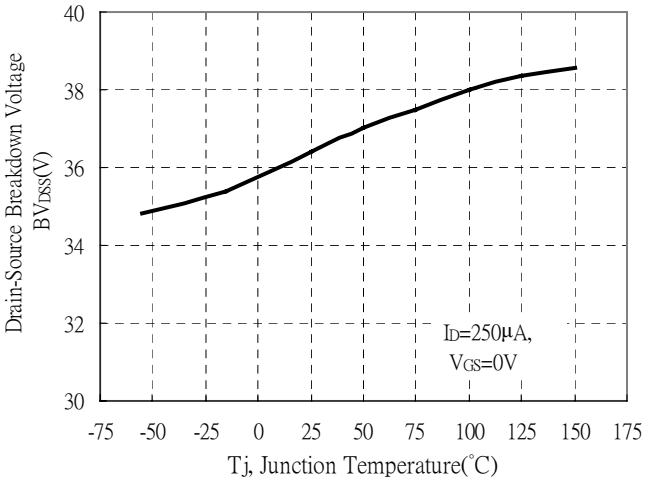


Typical Characteristics

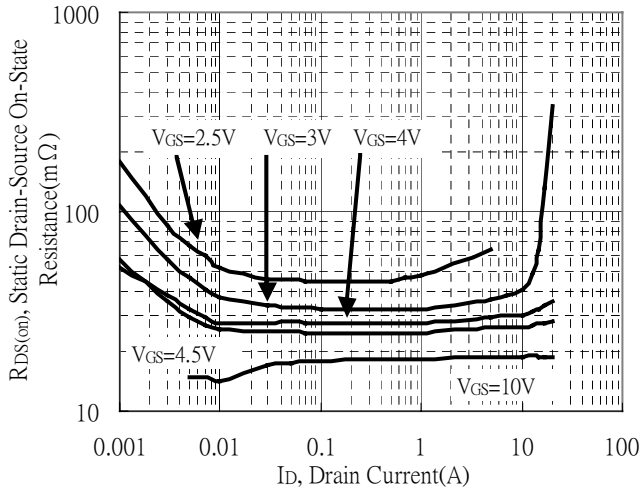
Typical Output Characteristics



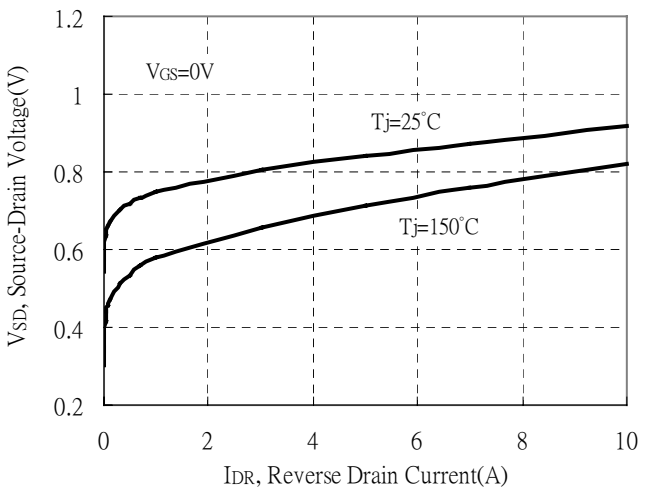
Brekdown Voltage vs Ambient Temperature



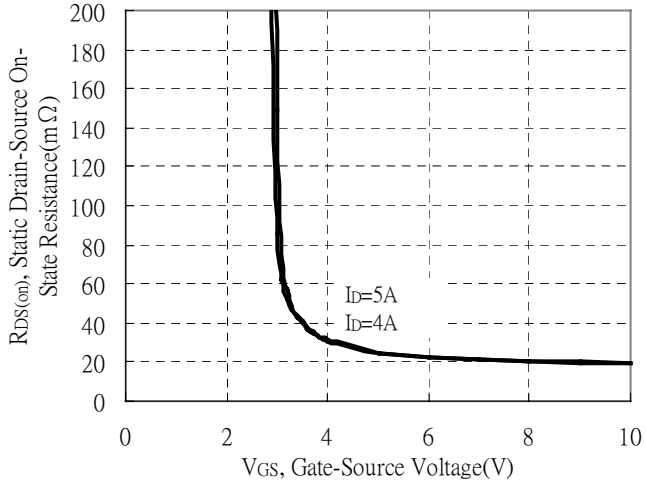
Static Drain-Source On-State resistance vs Drain Current



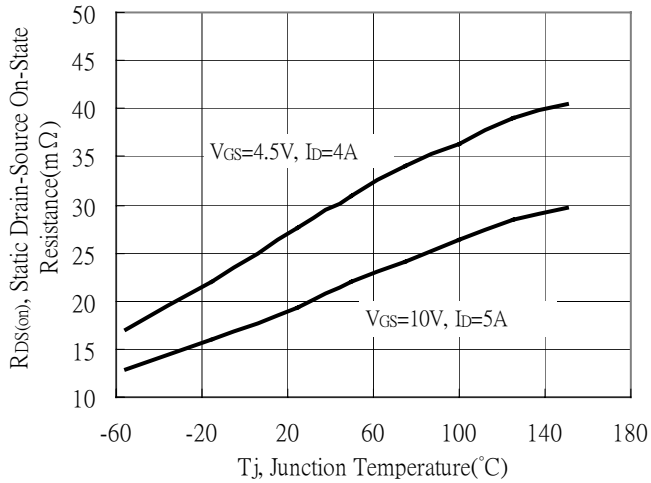
Reverse Drain Current vs Source-Drain Voltage



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

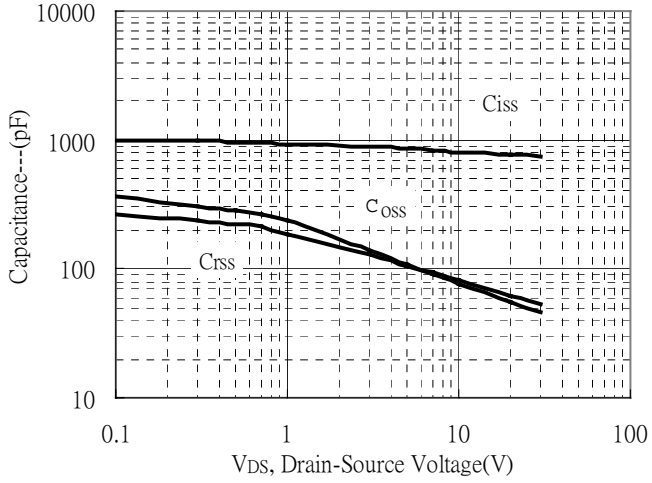


Drain-Source On-State Resistance vs Junction Tempearture

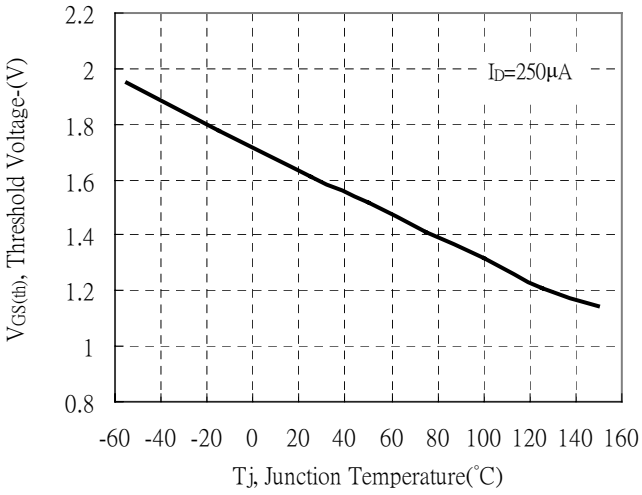


Typical Characteristics(Cont.)

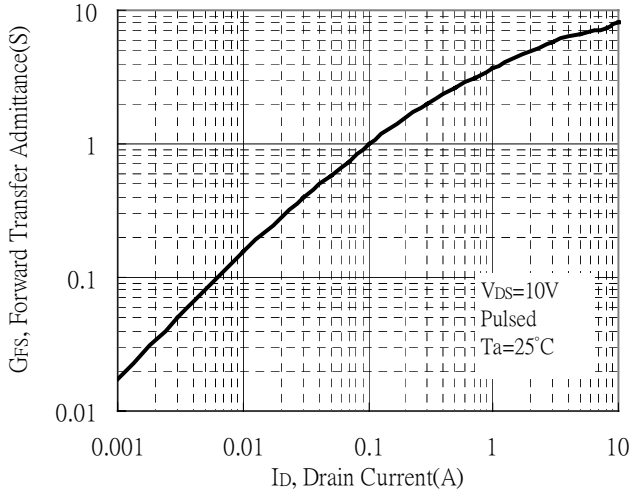
Capacitance vs Drain-to-Source Voltage



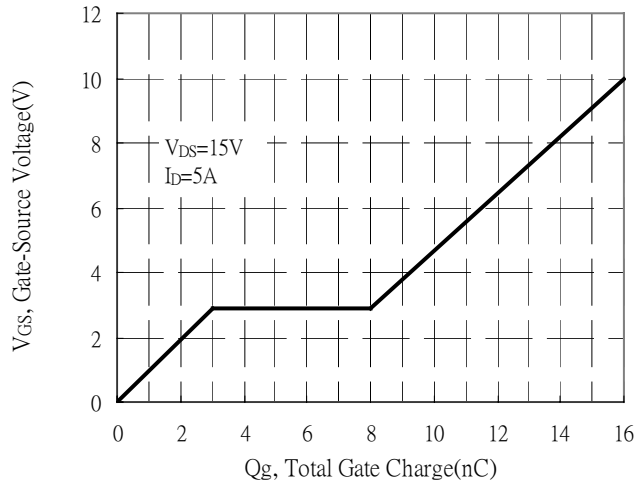
Threshold Voltage vs Junction Tempearture



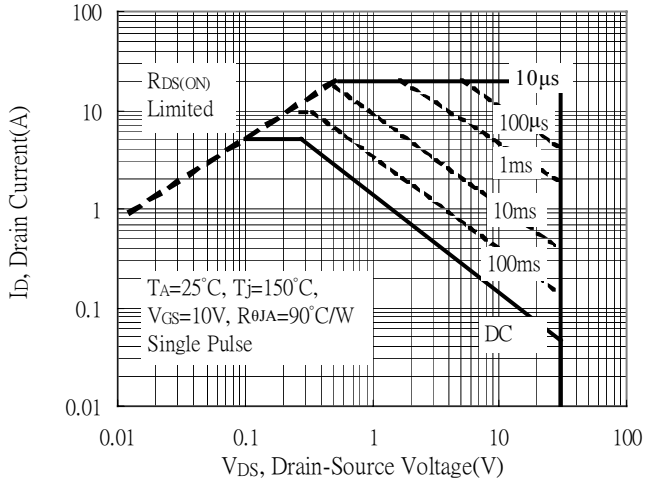
Forward Transfer Admittance vs Drain Current



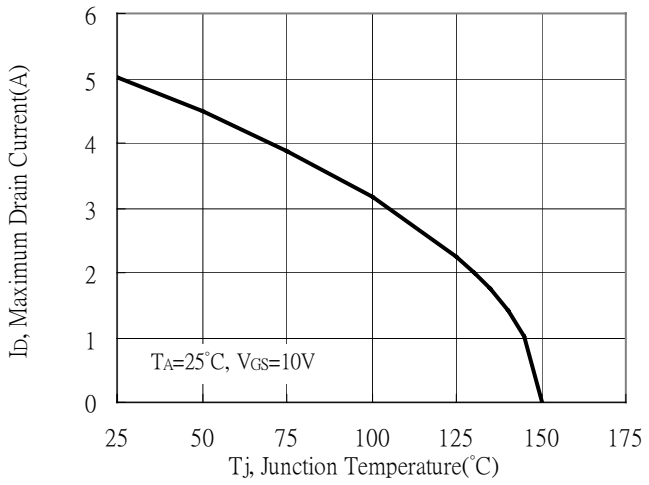
Gate Charge Characteristics



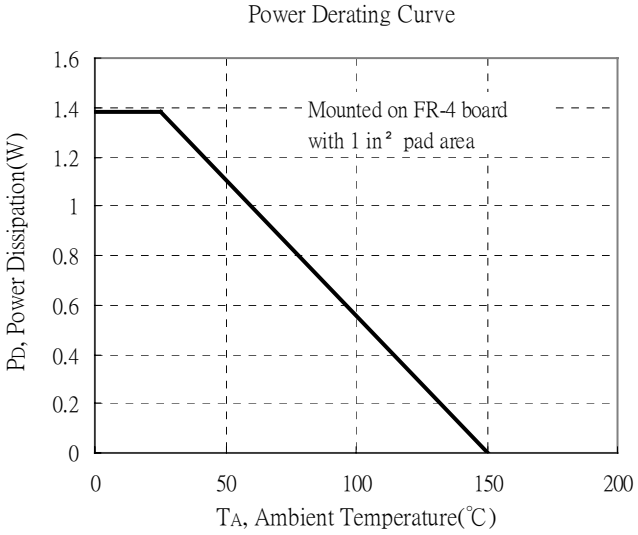
Maximum Safe Operating Area

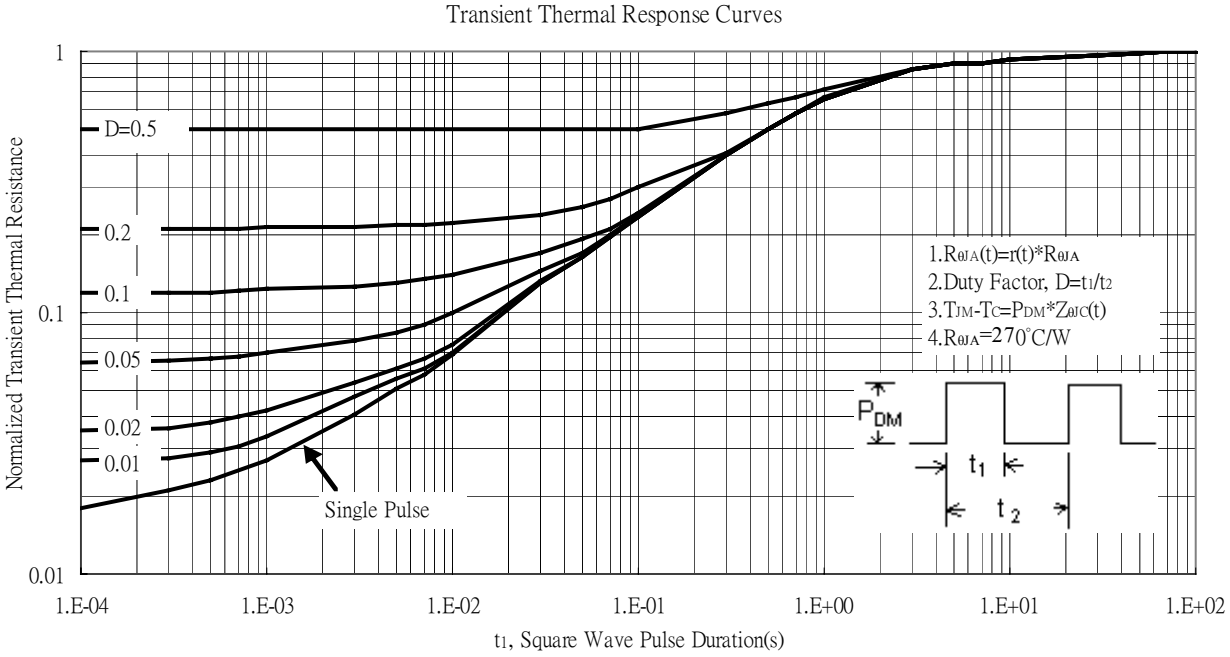


Maximum Drain Current vs JunctionTemperature

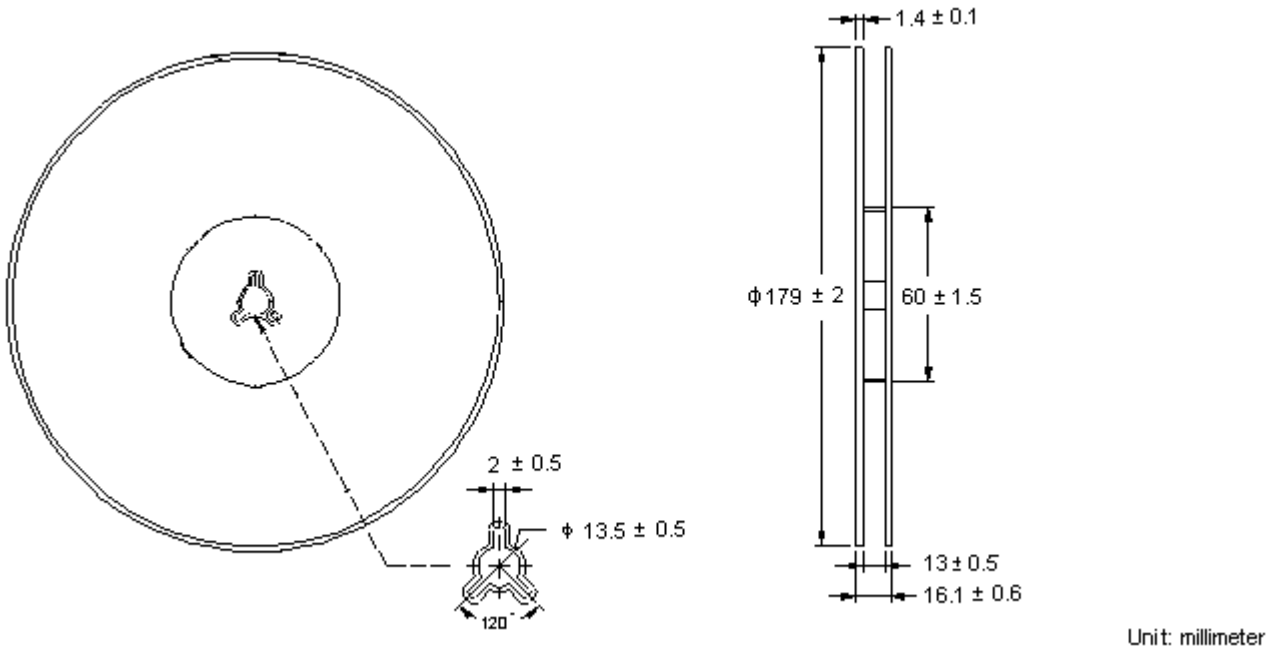


Typical Characteristics(Cont.)

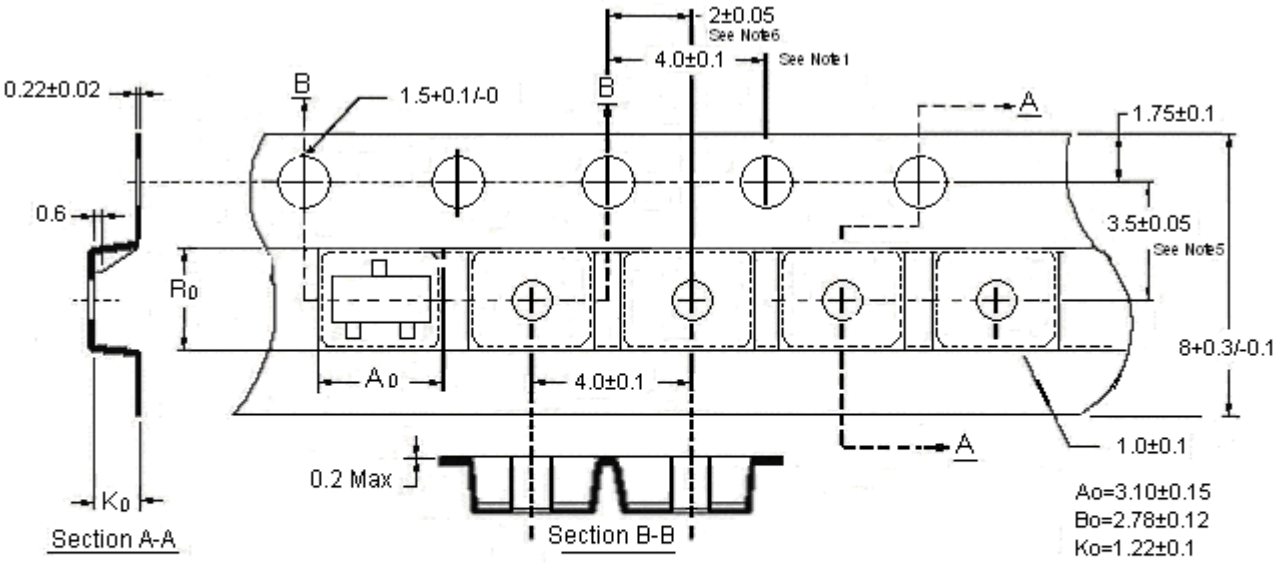




Reel Dimension



Carrier Tape Dimension



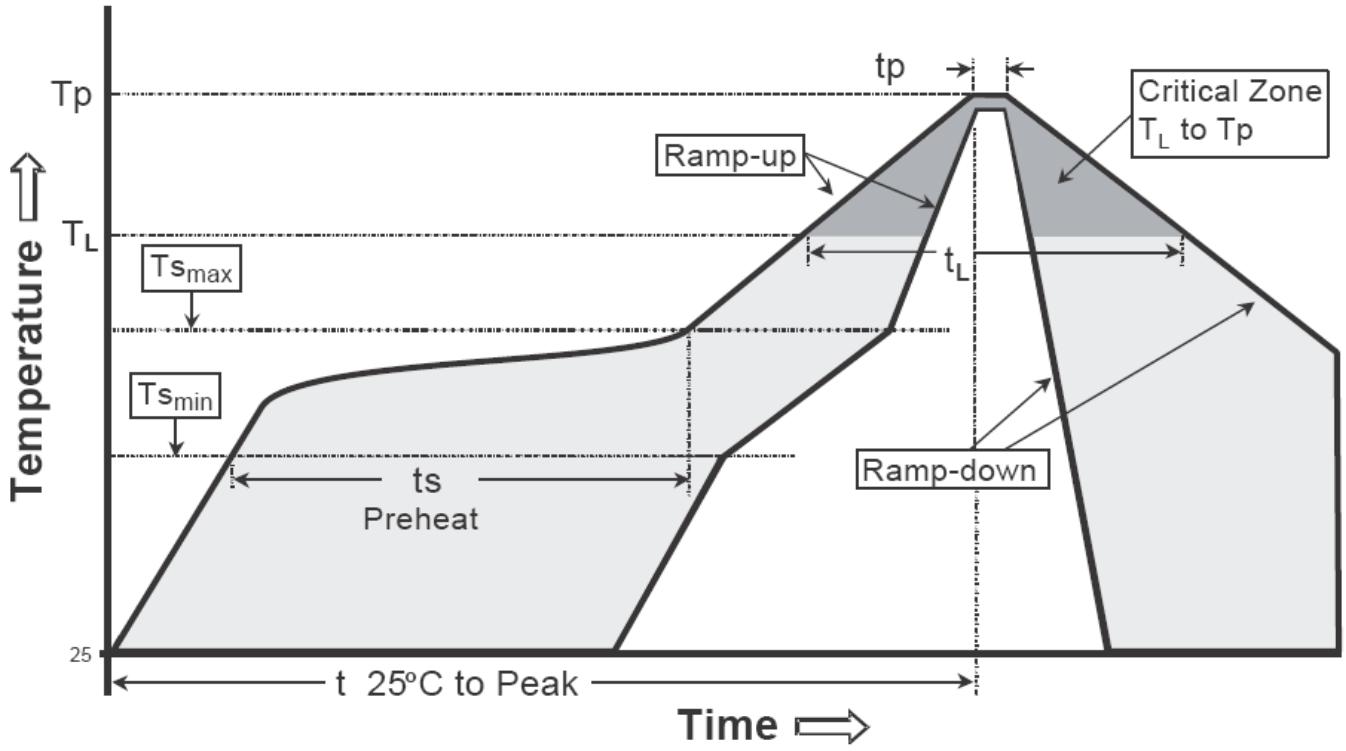
Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material : conductive Black Polystyrene.
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.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

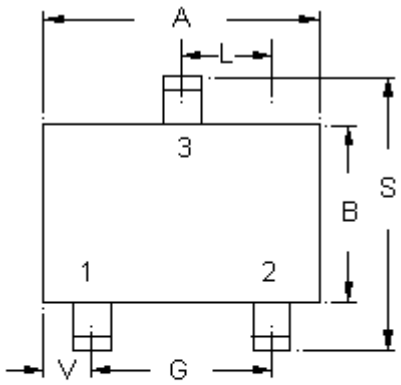
Recommended temperature profile for IR reflow

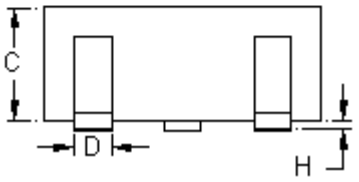


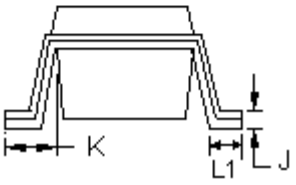
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − Time (tL)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature(TP)	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.

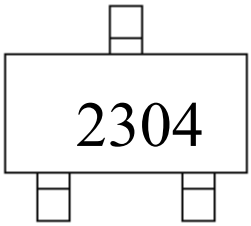
SOT-23 Dimension







Marking:



3-Lead SOT-23 Plastic
Surface Mounted Package
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	L1	0.0118	0.0197	0.30	0.50

Notes : 1.Controlling dimension : millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.

Material :

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