N-Channel Enhancement Mode Power MOSFET

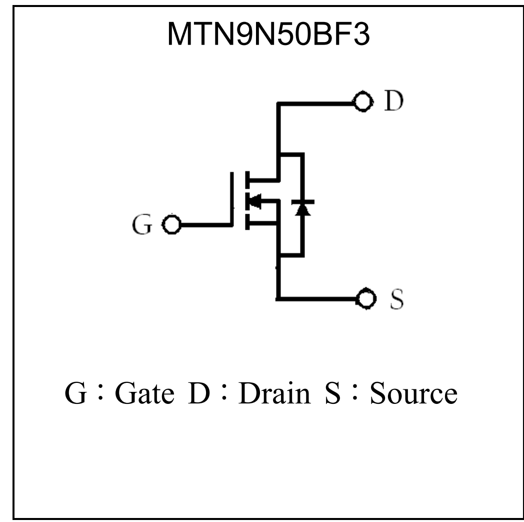
MTN9N50BF3

BV_{DSS}	500V
I_D @ V_{GS}=10V, T_C=25°C	8.5A
I_D @ V_{GS}=10V, T_C=100°C	5.4A
$R_{DSON(TYP)}$ @ V_{GS}=10V, I_D=4.5A	0.71Ω

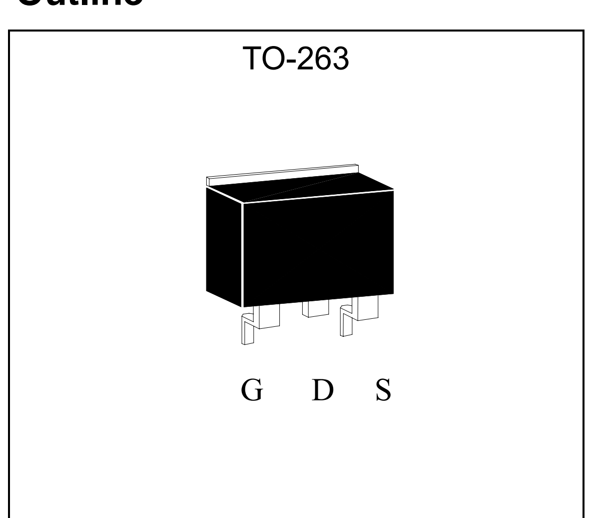
Features

- Low Gate Charge
- Simple Drive Requirement
- Fast Switching Characteristic
- RoHS compliant package

Symbol

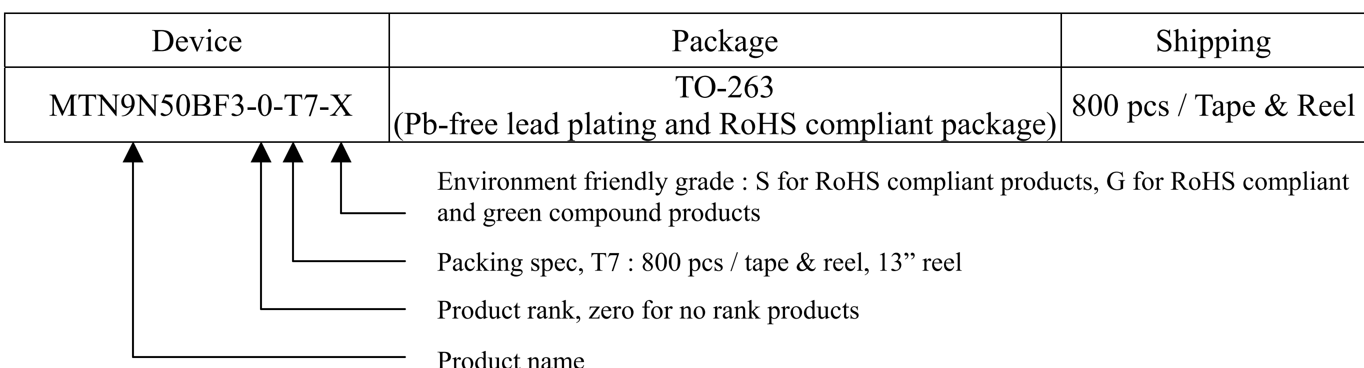


Outline



Ordering Information

Device	Package	Shipping
MTN9N50BF3-0-T7-X	TO-263 (Pb-free lead plating and RoHS compliant package)	800 pcs / Tape & Reel



Absolute Maximum Ratings (T_C=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage (Note 1)	V_{DS}	500	V
Gate-Source Voltage	V_{GS}	±30	
Continuous Drain Current @T_C=25°C, V_{GS}=10V	I_D	8.5*	A
Continuous Drain Current @T_C=100°C, V_{GS}=10V		5.4*	
Pulsed Drain Current @ V_{GS}=10V (Note 2)	I_{DM}	34*	
Single Pulse Avalanche Energy (Note 3)	E_{AS}	290	mJ
Avalanche Current (Note 2)	I_{AS}	8	A
Repetitive Avalanche Energy (Note 2)	E_{AR}	12.5	mJ
Maximum Temperature for Soldering @ Lead at 0.125 in(3.175mm) from case for 10 seconds	T_L	300	°C
Total Power Dissipation (T_C=25℃)	P_D	134	W
Linear Derating Factor above 25℃		1.07	W/°C
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150	°C

*Drain current limited by maximum junction temperature

Note : 1. T_J=+25℃ to +150℃.
2. Repetitive rating; pulse width limited by maximum junction temperature.
3. I_{AS}=8A, V_{DD}=50V, L=5mH, R_G=25Ω, starting T_J=+25℃. 100% tested by conditions of I_{AS}=5.4A, L=5mH, V_{GS}=10V, V_{DD}=50V

Thermal Data

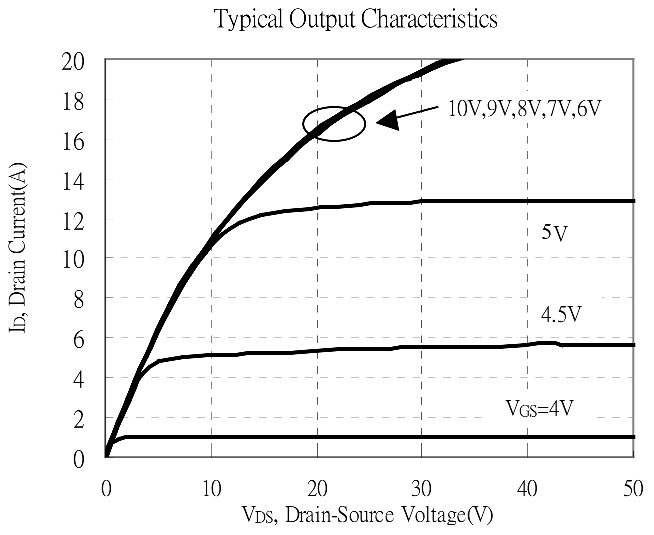
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	0.93	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{\theta JA}$	62.5	

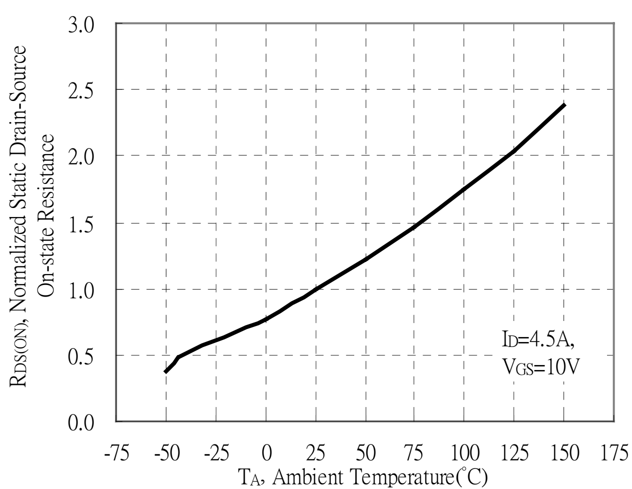
Characteristics (Tj=25°C, unless otherwise specified)

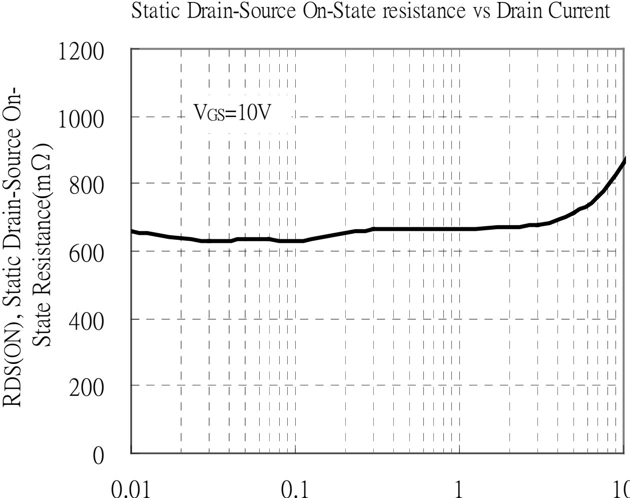
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	500	-	-	V	V_{GS}=0V, I_D=250μA
$\Delta BV_{DSS}/\Delta Tj$	-	0.6	-	V/°C	Reference to 25°C, I_D=250μA
$V_{GS(th)}$	2.0	-	4.0	V	V_{DS} = V_{GS}, I_D=250μA
*G_{FS}	-	8	-	S	V_{DS} =15V, I_D=4A
I_{GSS}	-	-	±100	nA	V_{GS}=±30V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS} =500V, V_{GS} =0V
	-	-	25		V_{DS} =400V, V_{GS} =0V, Tj=125°C
*$R_{DS(ON)}$	-	0.71	0.9	Ω	V_{GS} =10V, I_D=4.5A
Dynamic					
*Qg	-	26.4	-	nC	I_D=4.5A, V_{DD}=250V, V_{GS}=10V
*Qgs	-	4.8	-		
*Qgd	-	9.9	-		
*$t_{d(ON)}$	-	14	-	ns	V_{DD}=250V, I_D=4.5A, V_{GS}=10V, R_G=1Ω
*tr	-	8.8	-		
*$t_{d(OFF)}$	-	42.6	-		
*t_f	-	7.8	-		
Ciss	-	975	-	pF	V_{GS}=0V, V_{DS}=25V, f=1MHz
Coss	-	108	-		
Crss	-	76	-		
Source-Drain Diode					
*I_S	-	-	8	A	
*I_{SM}	-	-	32		
*V_{SD}	-	0.8	1.2	V	I_S=4.5A, V_{GS}=0V
*trr	-	242	-	ns	V_{GS}=0V, I_F=4.5, dI_F/dt=100A/μs
*Qrr	-	1.5	-	μC	

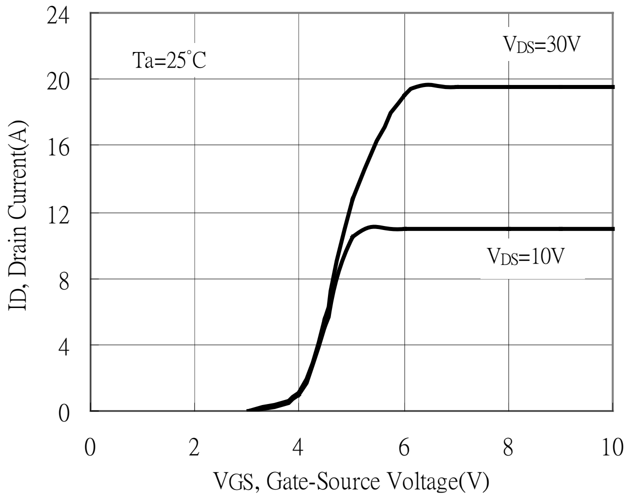
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

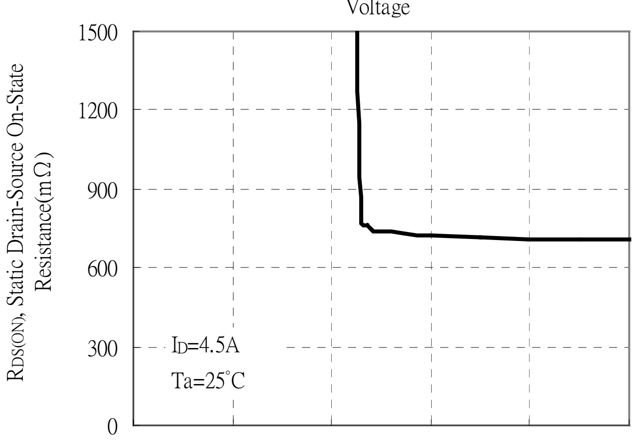
Typical Characteristics

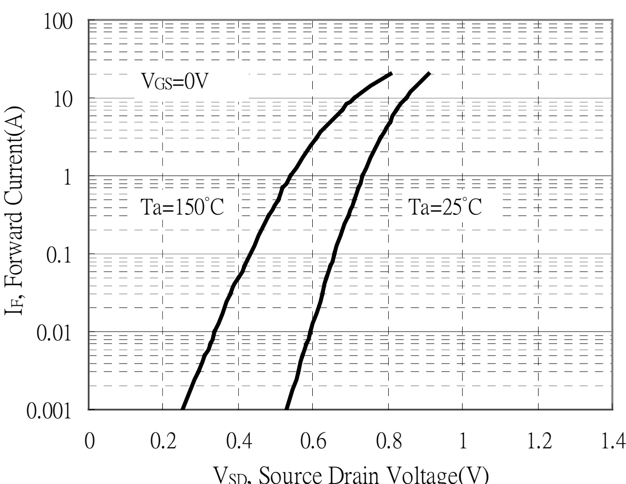








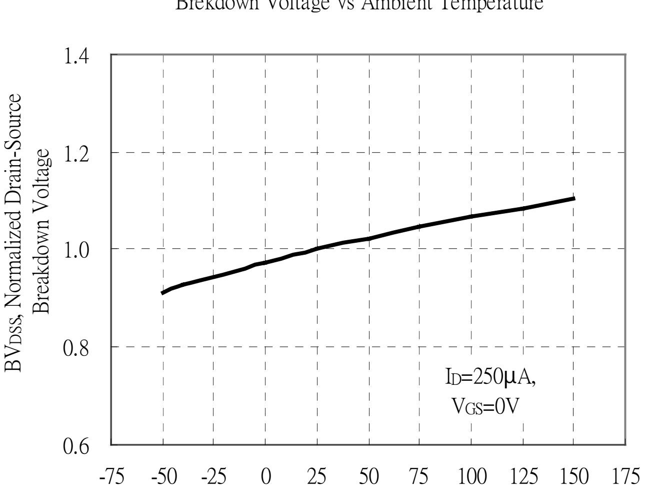




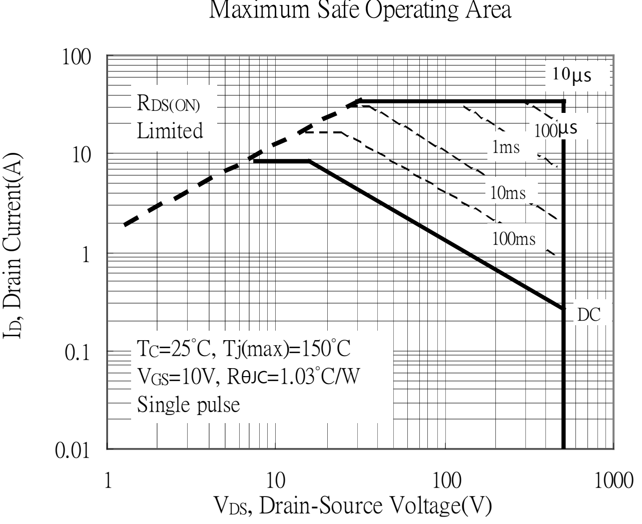
Typical Characteristics(Cont.)

Capacitance vs Reverse Voltage

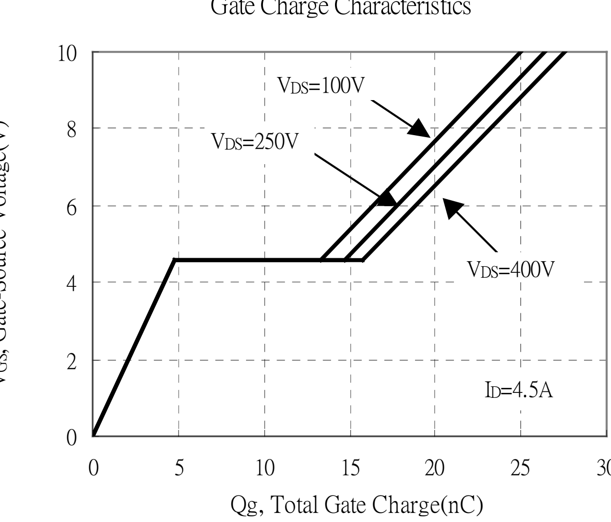
Brekdown Voltage vs Ambient Temperature



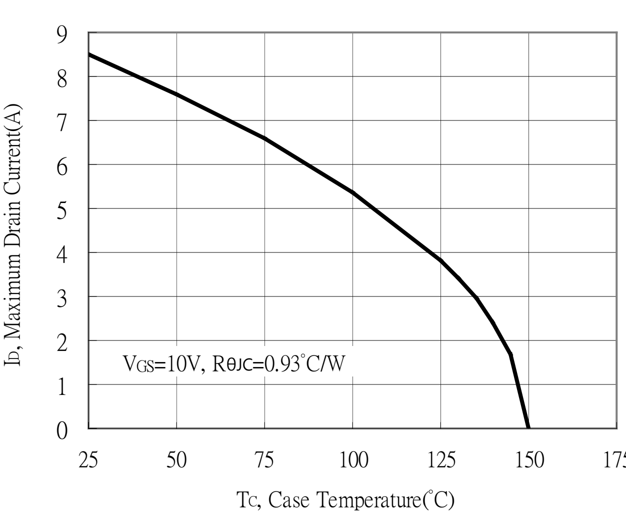
Maximum Safe Operating Area



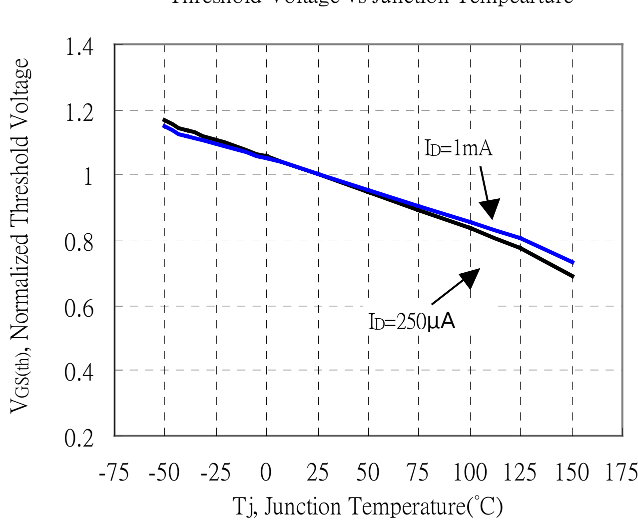
Gate Charge Characteristics



Maximum Drain Current vs Case Temperature



Threshold Voltage vs Junction Tempearture



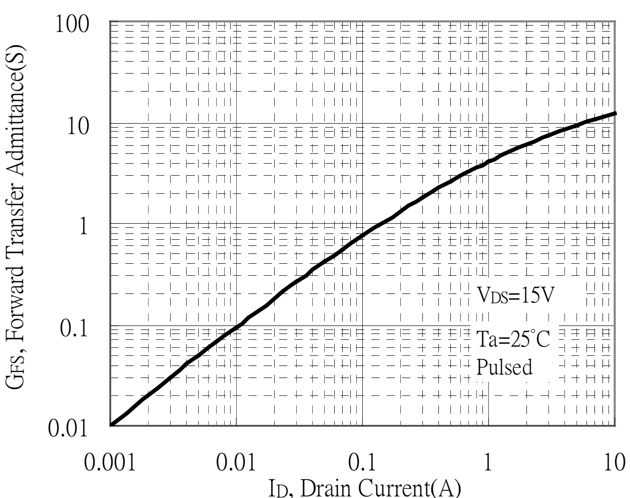
Typical Characteristics(Cont.)

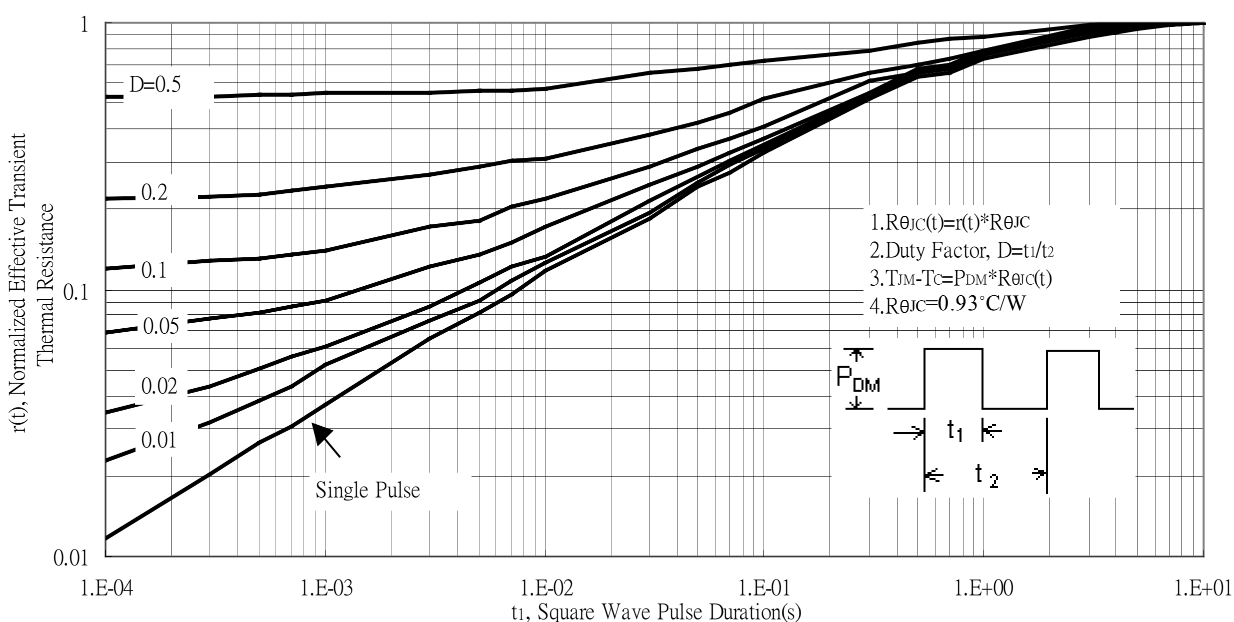
Single Pulse Power Rating, Junction to Case

Power (W)

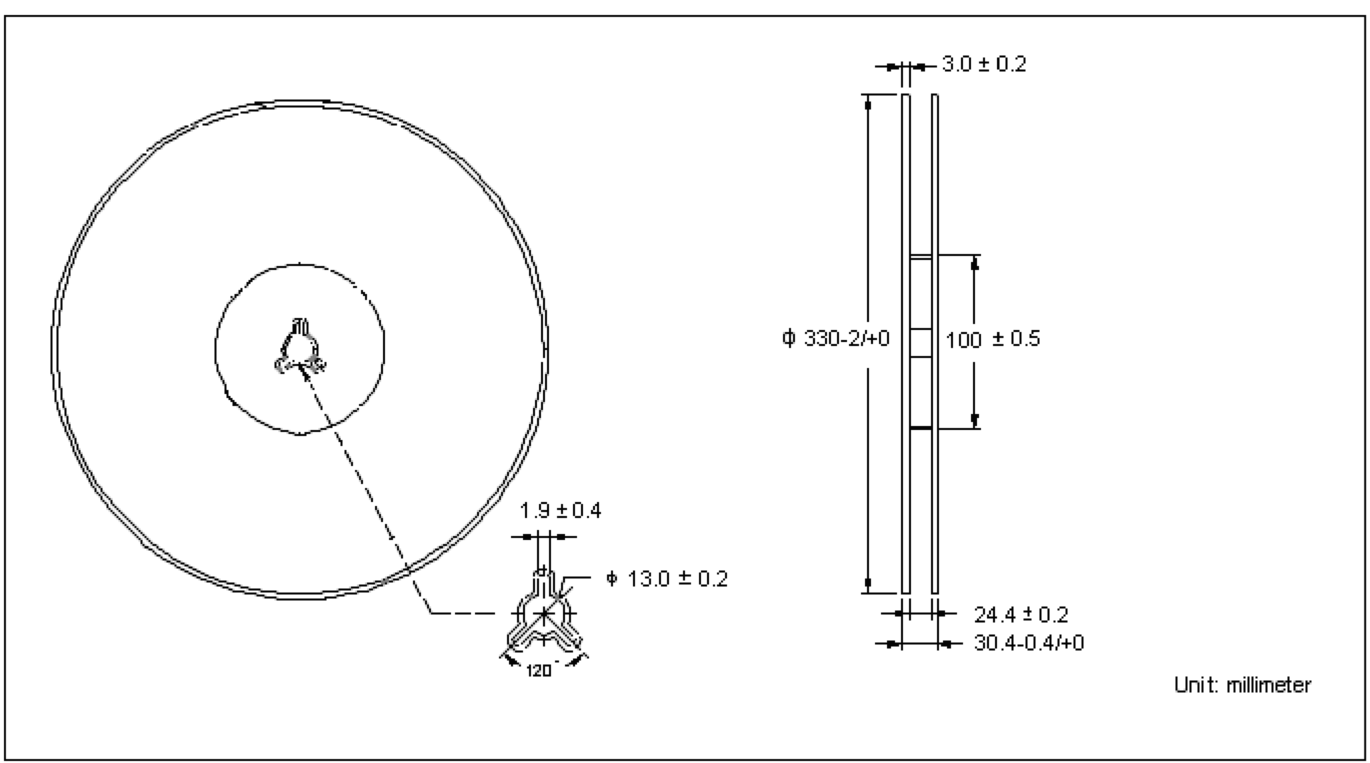
$T_{J(MAX)}$=150°C
T_C=25°C
$R_{\theta JC}$=0.93°C/W

Pulse Width(s)

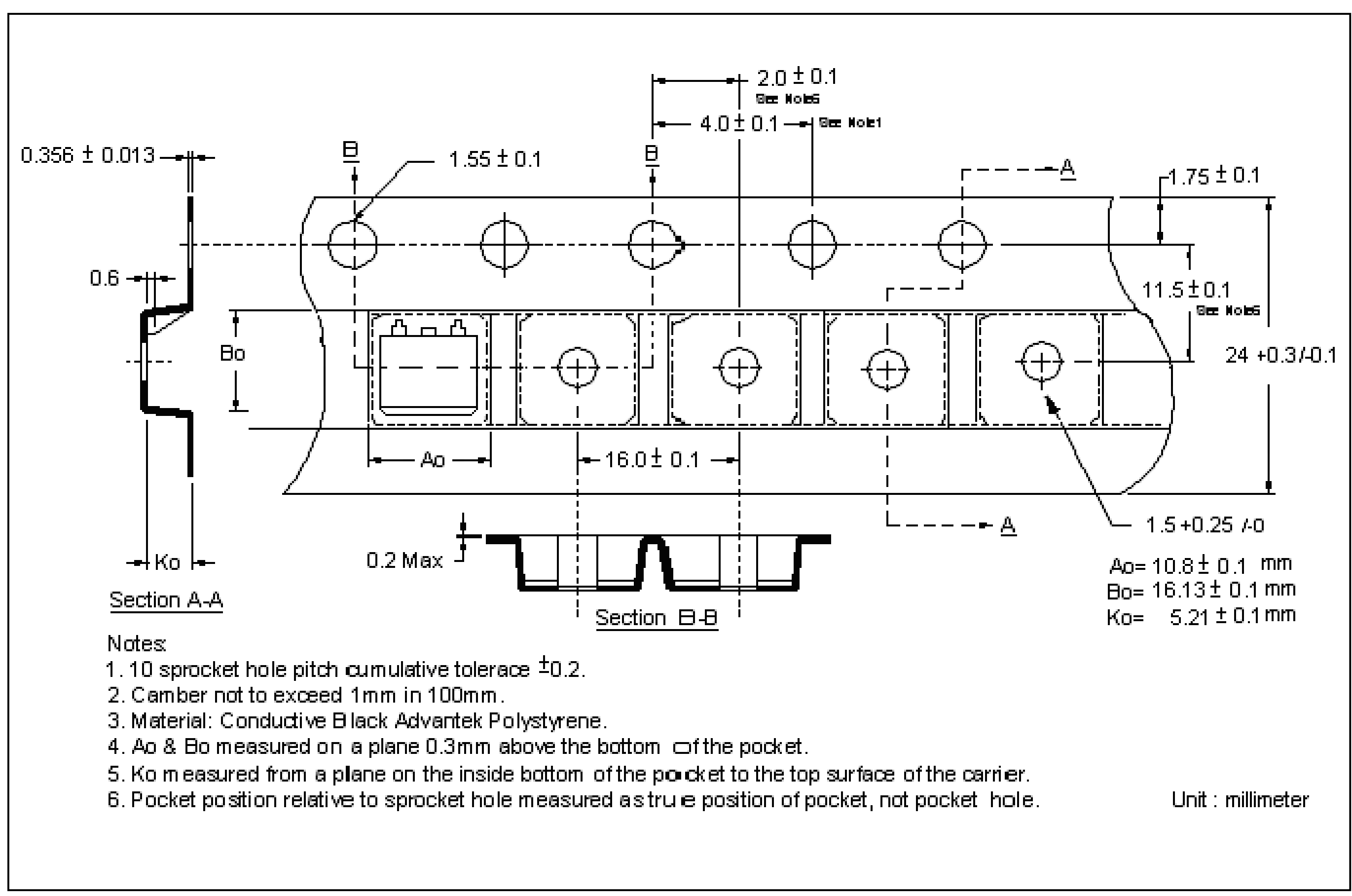




Reel Dimension



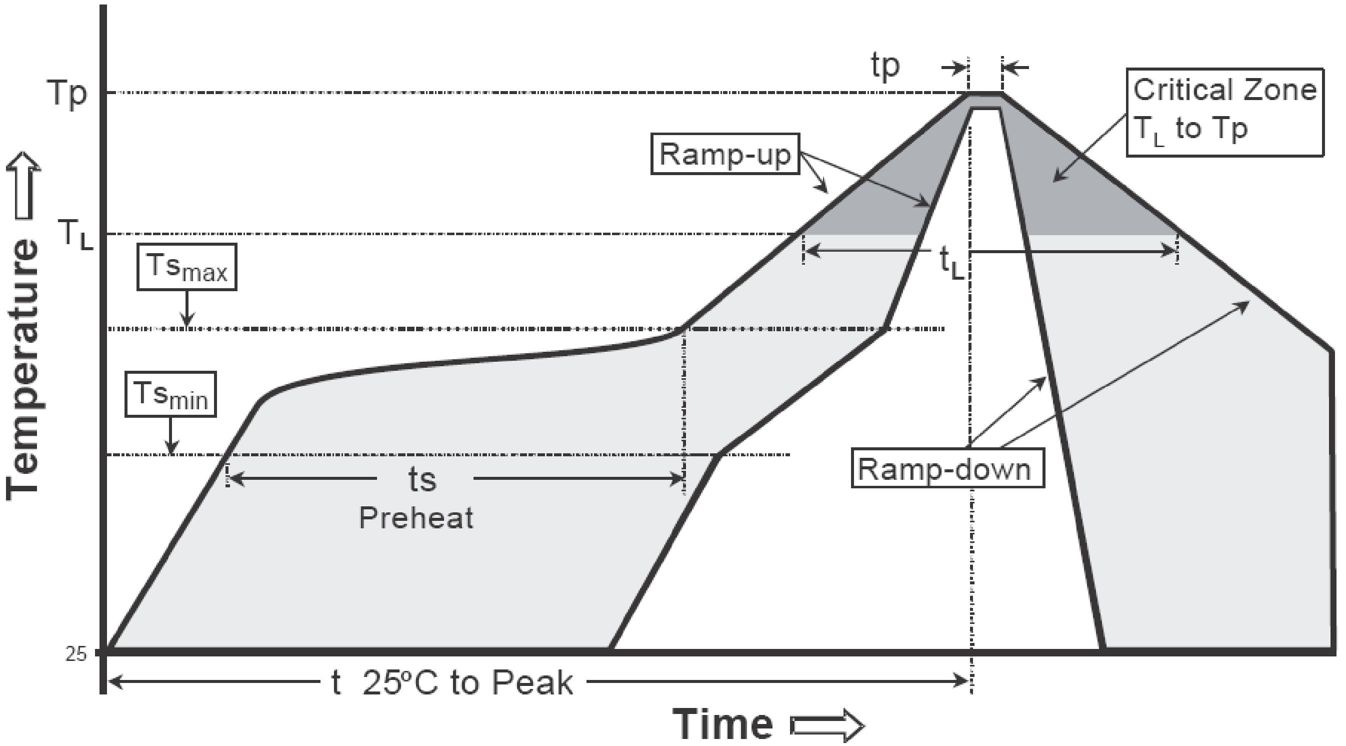
Carrier Tape Dimension



Recommended wave soldering condition

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

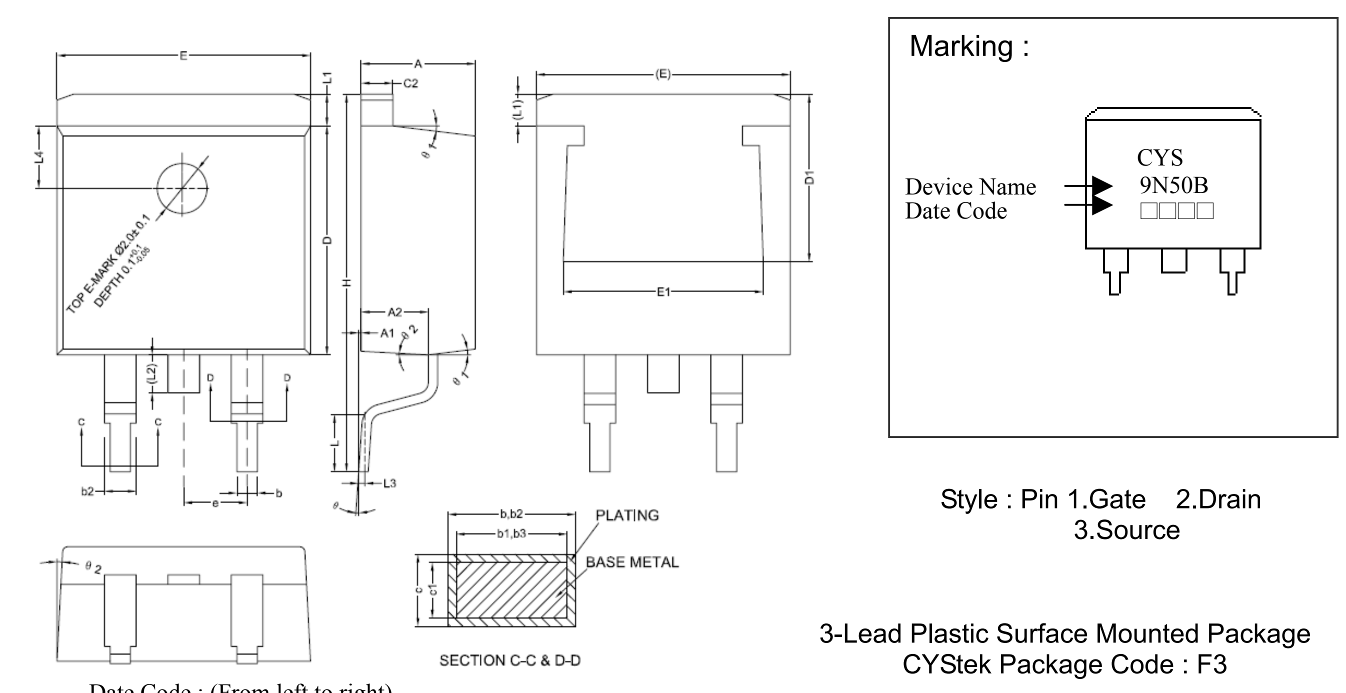
Recommended temperature profile for IR reflow



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.

TO-263 Dimension



Date Code : (From left to right)
First Code : Year code, the last digit of Christinr year. For example, 2014→4, 2015→, 2016→6, …, etc.
Second Code : Month code, Jan→A, Feb→B, Mar→C, Apr→D, May→E, Jun→F, Jul→G, Aug→H, Sep→J, Oct→K, Nov→L, Dec→M
Third and fourth codes : production serial number, 01~99

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	4.40	4.70	0.173	0.185	E	10.06	10.26	0.396	0.404
A1	0.00	0.25	0.000	0.010	E1	7.80	8.20	0.307	0.323
A2	2.59	2.79	0.102	0.110	e	2.54 BSC		0.100 BSC	
b	0.77	0.90	0.030	0.035	H	14.70	15.50	0.579	0.610
b1	0.76	0.86	0.030	0.034	L	2.00	2.60	0.079	0.102
b2	1.23	1.36	0.048	0.054	L1	1.17	1.40	0.046	0.055
b3	1.22	1.32	0.048	0.052	L2	-	1.75	-	0.069
c	0.34	0.47	0.013	0.019	L3	0.25 BSC		0.010 BSC	
c1	0.33	0.43	0.013	0.017	L4	2.00 REF		0.079 BSC	
c2	1.22	1.32	0.048	0.052	θ	0°	8°	0°	8°
D	9.05	9.25	0.356	0.364	Θ1	5°	9°	5°	9°
D1	6.60	-	0.260	-	Θ2	1°	5°	1°	5°

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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