N-Channel Enhancement Mode Power MOSFET

MTB012N04J3

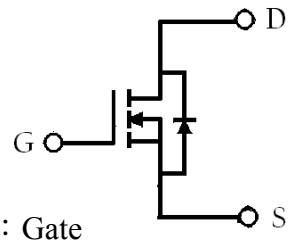
BV_{DSS}	**40V**
I_D@V_{GS}=10V, T_C=25°C	**40A**
$R_{DS(ON)}$@V_{GS}=10V, I_D=20A	**9.6 mΩ (typ)**
$R_{DS(ON)}$@V_{GS}=4.5V, I_D=20A	**13.4 mΩ (typ)**

Features

- Simple Drive Requirement
- Repetitive Avalanche Rated
- Fast Switching Characteristic
- RoHS compliant package & Halogen-free package

Symbol

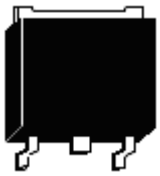
MTB012N04J3



G：Gate
D：Drain
S：Source

Outline

TO-252(DPAK)



G D S

Ordering Information

Device	Package	Shipping
MTB012N04J3-0-T3-G	TO-252 (Pb-free lead plating and halogen-free package)	2500 pcs / Tape & Reel

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

Packing spec, T3 : 2500 pcs / tape & reel, 13” reel

Product rank, zero for no rank products

Product name

Absolute Maximum Ratings (T_C=25°C, unless otherwise noted)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	
Continuous Drain Current @ T_C=25°C	I_D	40	A
Continuous Drain Current @ T_C=100°C		28	
Pulsed Drain Current (Note 1)	I_{DM}	160	
Avalanche Current	I_{AS}	20	
Avalanche Energy @ L=0.1mH, I_D=20A, V_{DD}=15V	E_{AS}	20	mJ
Repetitive Avalanche Energy@ L=0.05mH (Note 2)	E_{AR}	10	
Total Power Dissipation @ T_C=25℃	P_D	50	W
Total Power Dissipation @ T_C=100℃		25	
Operating Junction and Storage Temperature Range	Tj, Tstg	-55~+175	°C

Note : 1. Pulse width limited by maximum junction temperature
2. Duty cycle ≤ 1%

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	3	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{\theta JA}$	75	

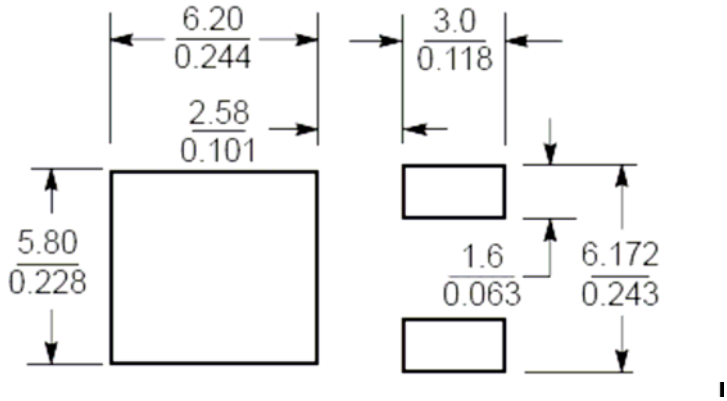
Characteristics (T_C=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	40	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	1.0	-	2.5		V_{DS} = V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS} =32V, V_{GS} =0V
	-	-	25		V_{DS} =30V, V_{GS} =0V, Tj=125°C
*$R_{DS(ON)}$	-	9.6	13	mΩ	V_{GS} =10V, I_D=20A
	-	13.4	20		V_{GS} =4.5V, I_D=10A
*G_{FS}	-	25	-	S	V_{DS} =5V, I_D=20A
Dynamic					
*Qg	-	14.4	-	nC	I_D=20A, V_{DS}=20V, V_{GS}=10V
*Qgs	-	2.8	-		
*Qgd	-	3	-		
*$t_{d(ON)}$	-	8.6	-	ns	V_{DS}=20V, I_D=1A, V_{GS}=10V, R_{GS}=6Ω
*tr	-	17.8	-		
*$t_{d(OFF)}$	-	39.8	-		
*t_f	-	10.4	-		

Ciss	-	697	-	pF	V_{GS}=0V, V_{DS}=20V, f=1MHz
Coss	-	109	-		
Crss	-	56	-		
Rg	-	3.5	-	Ω	f=1MHz
Source-Drain Diode					
*I_S	-	-	40	A	
*I_{SM}	-	-	160		
*V_{SD}	-	0.88	1.3	V	I_S=25A, V_{GS}=0V
*trr	-	11	-	ns	I_F=25A, V_{GS}=0V, dI_F/dt=100A/μs
*Qrr	-	6	-	nC	

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

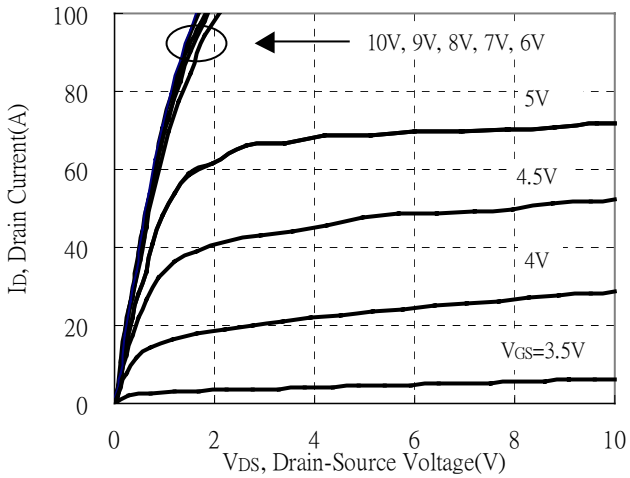
Recommended soldering footprint



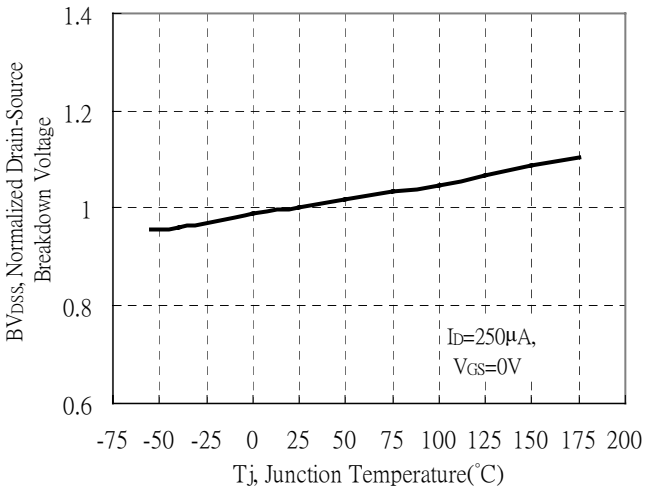
Unit (mm / inch)

Typical Characteristics

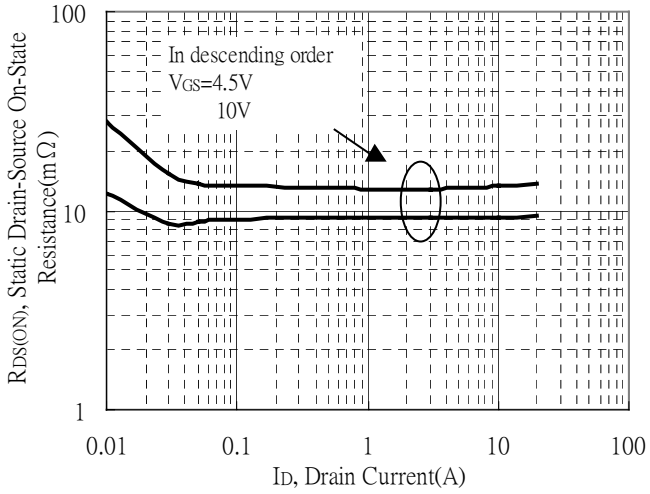
Typical Output Characteristics



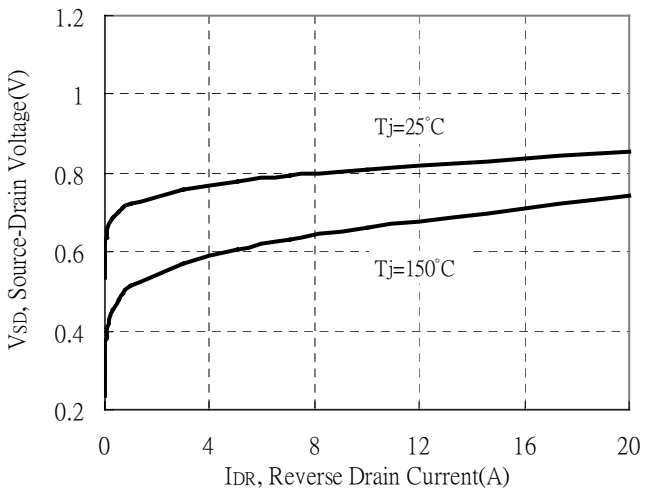
Brekdown Voltage vs Ambient Temperature



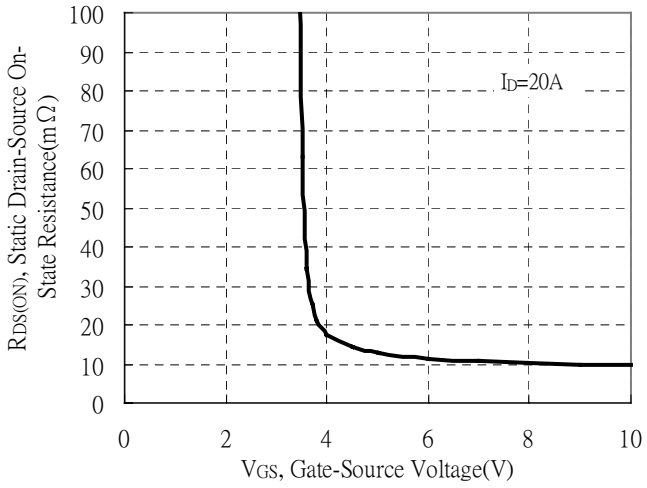
Static Drain-Source On-State resistance vs Drain Current



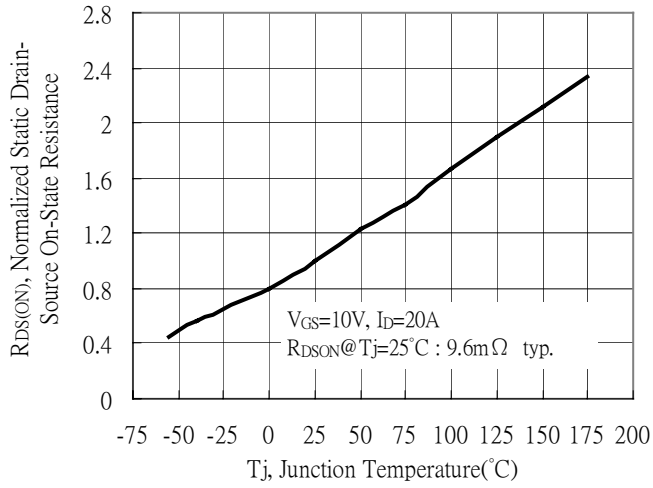
Reverse Drain Current vs Source-Drain Voltage



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

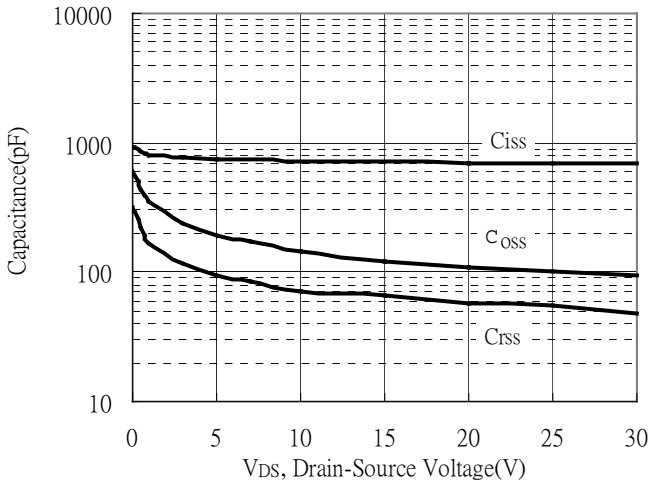


Drain-Source On-State Resistance vs Junction Tempearture

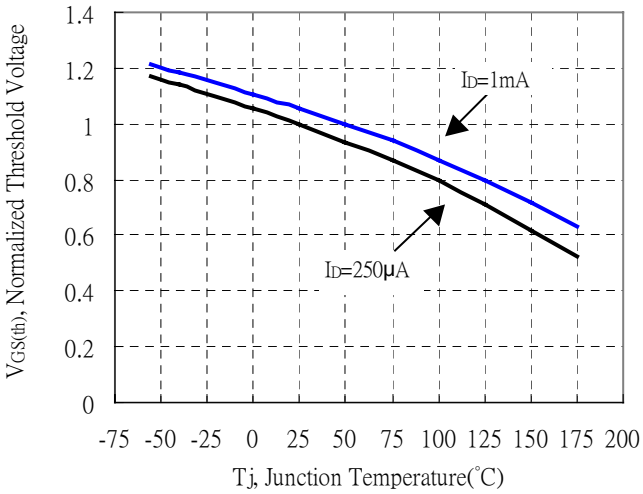


Typical Characteristics(Cont.)

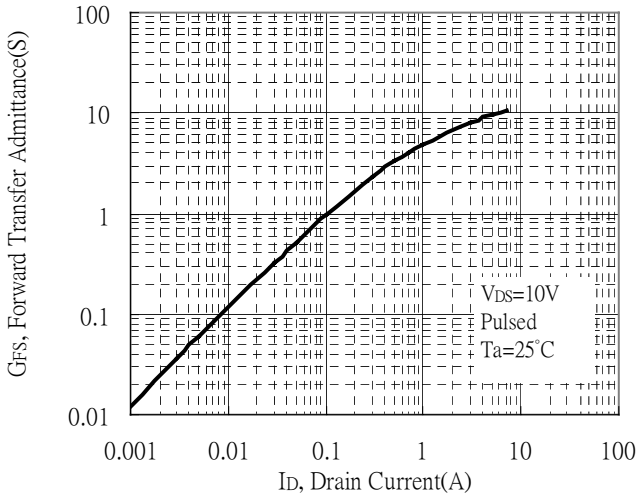
Capacitance vs Drain-to-Source Voltage



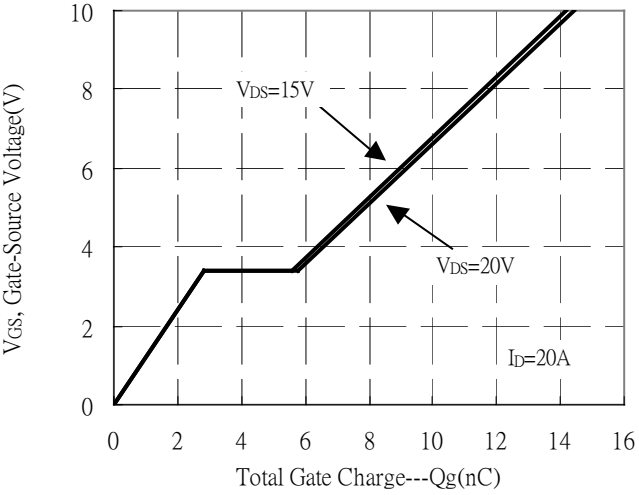
NormalizedThreshold Voltage vs Junction Tempearture



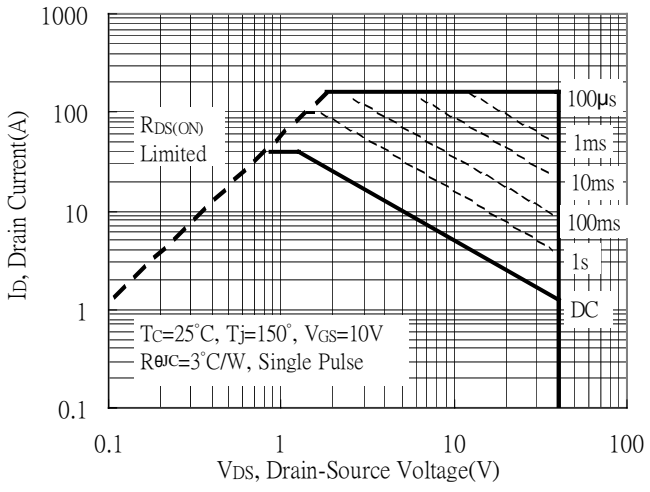
Forward Transfer Admittance vs Drain Current



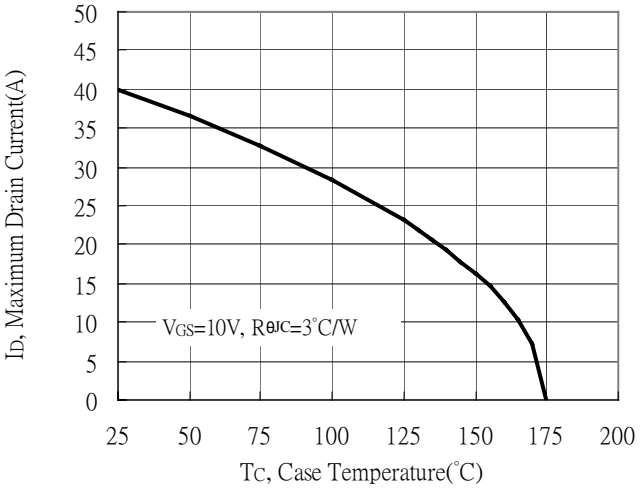
Gate Charge Characteristics



Maximum Safe Operating Area

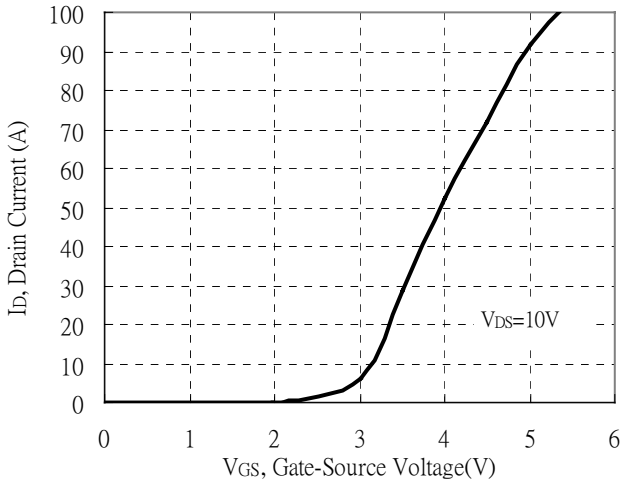


Maximum Drain Current vs Case Temperature

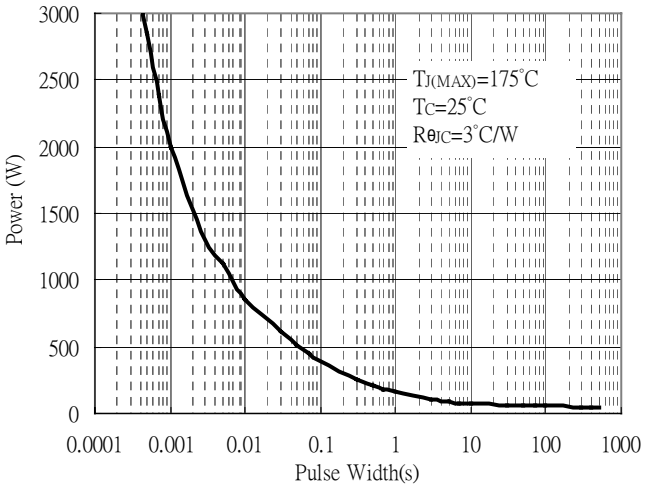


Typical Characteristics(Cont.)

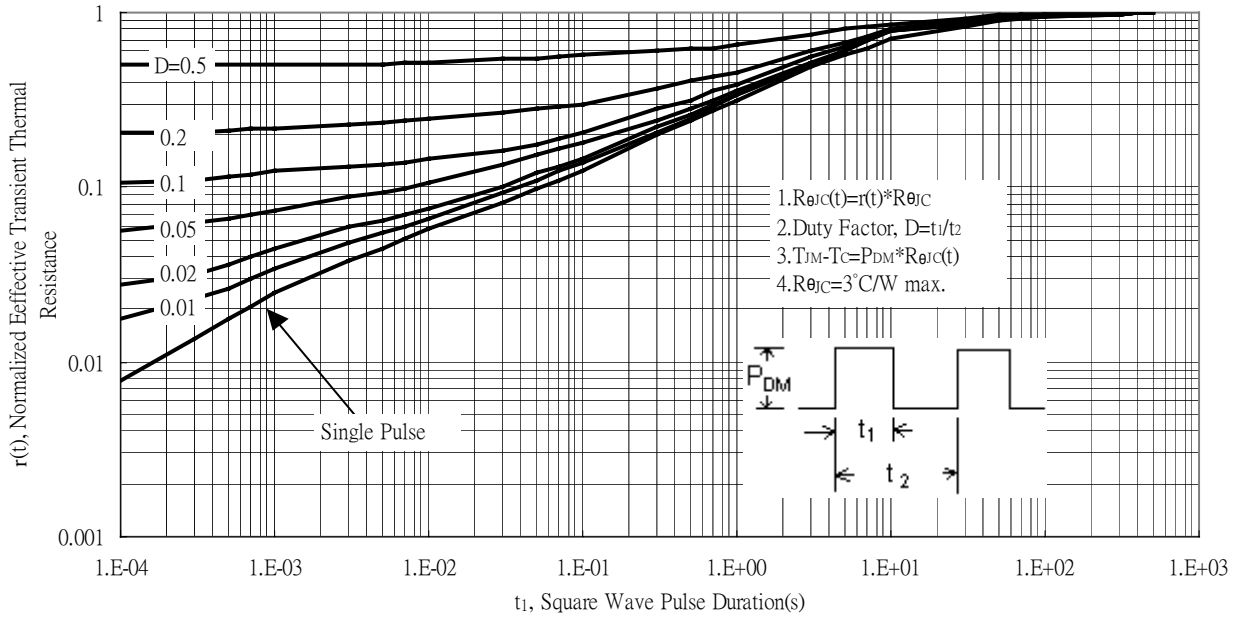
Typical Transfer Characteristics



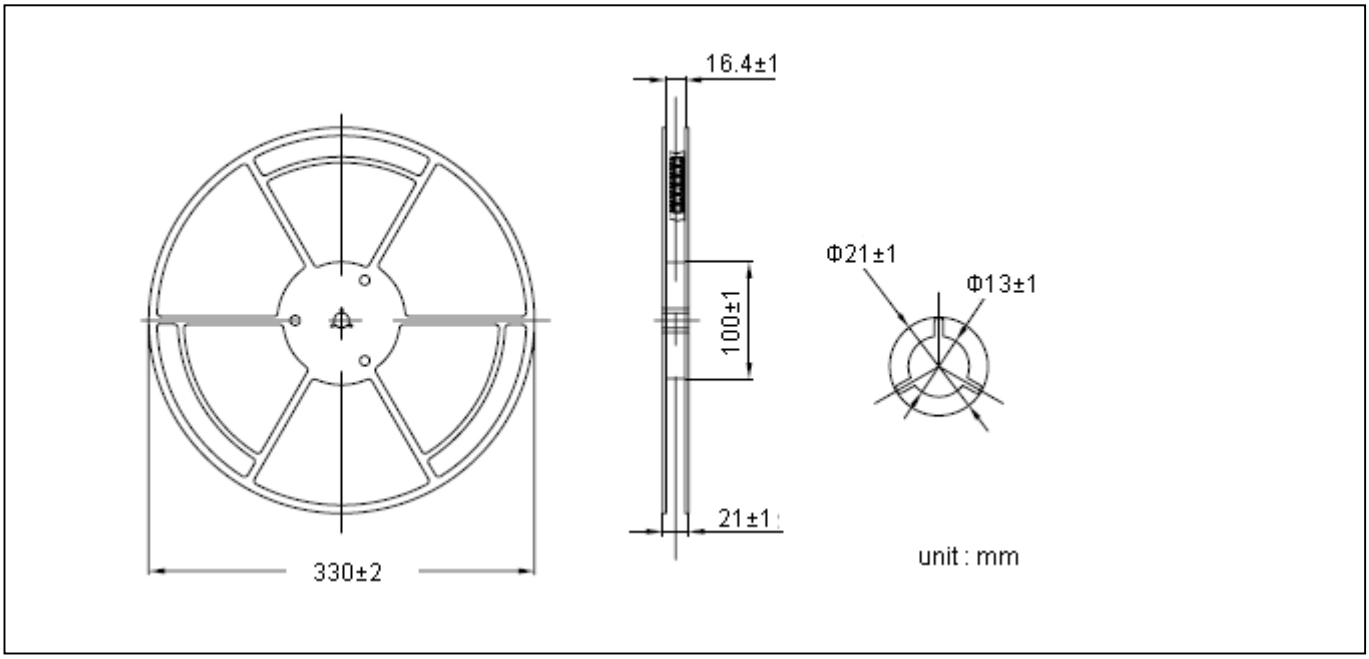
Single Pulse Maximum Power Dissipation



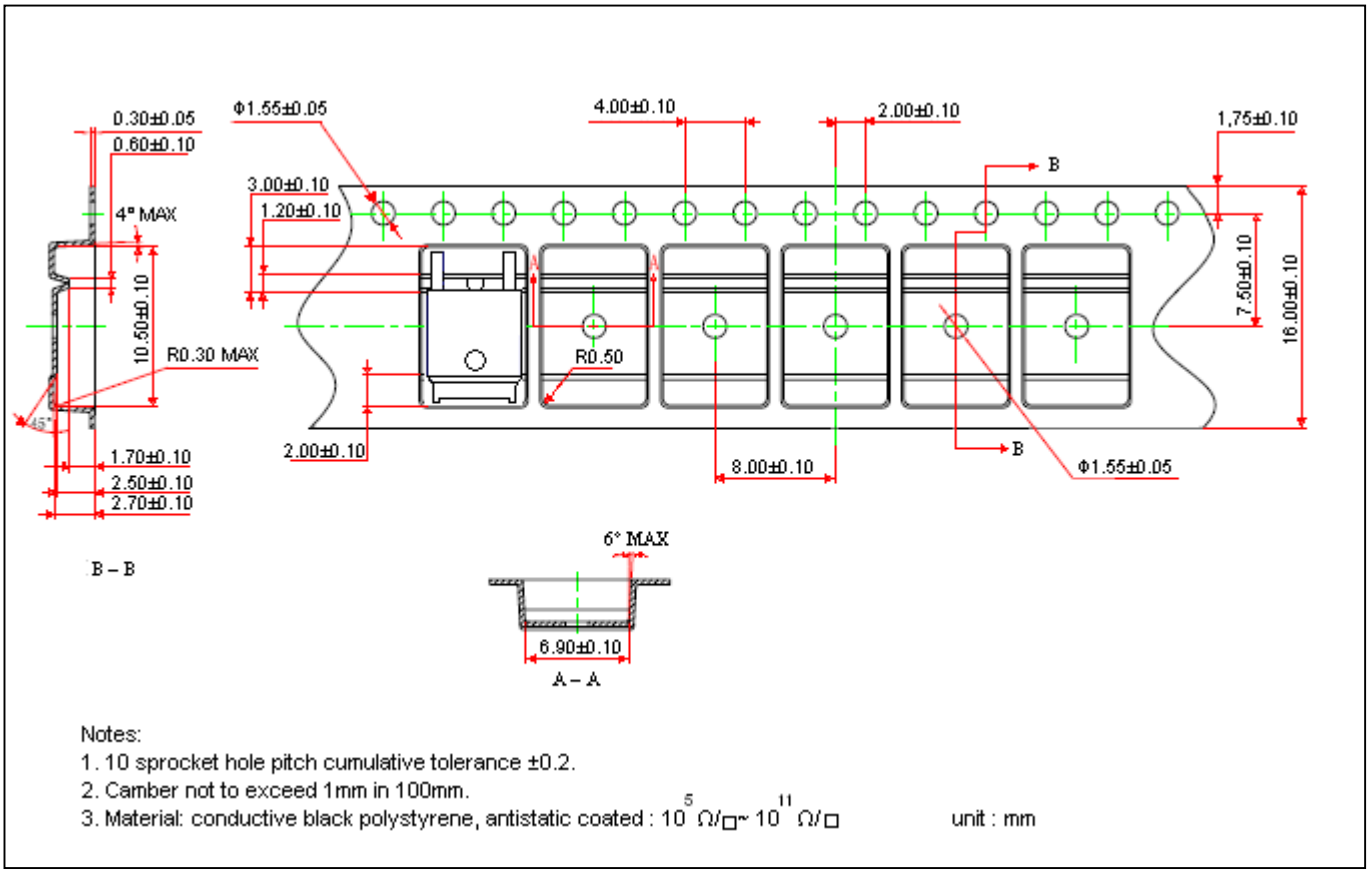
Transient Thermal Response Curves



Reel Dimension



Carrier Tape Dimension

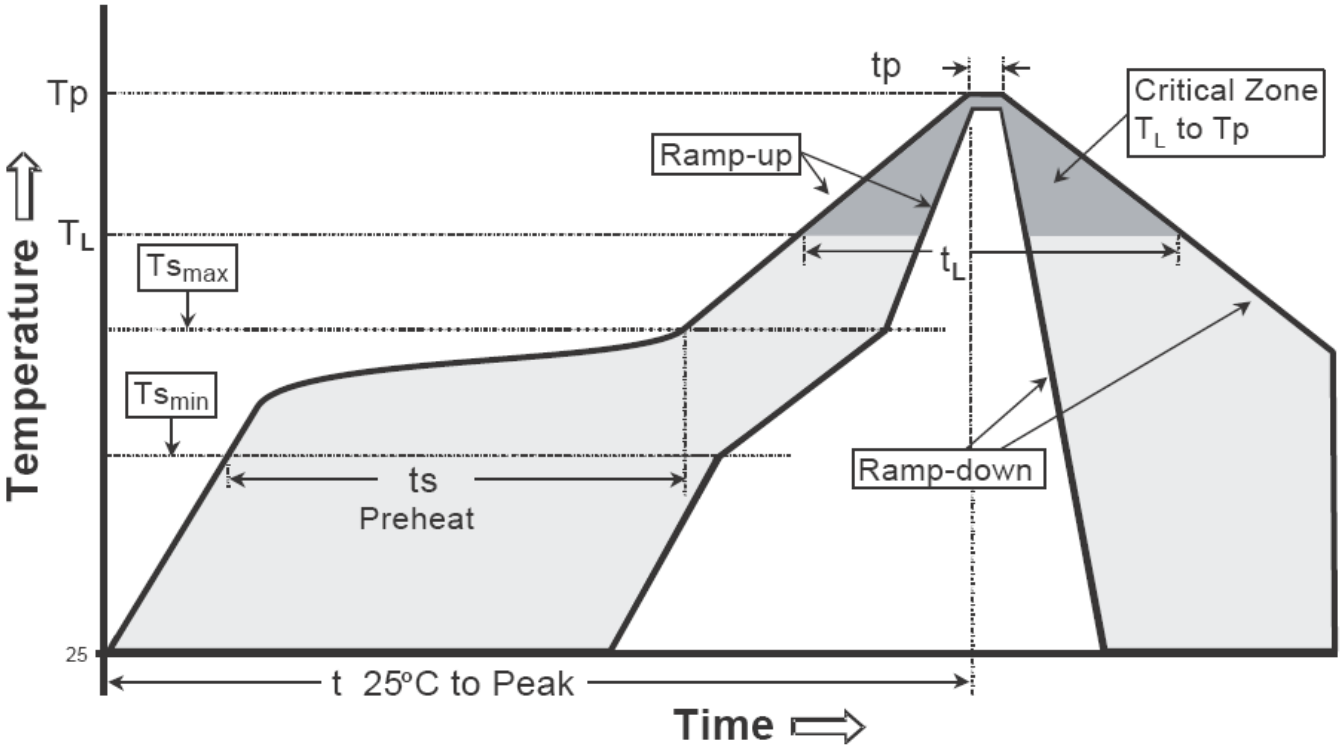


Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene, antistatic coated : 10^{5} Ω/□~ 10^{11} Ω/□ unit : mm

Recommended wave soldering condition

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

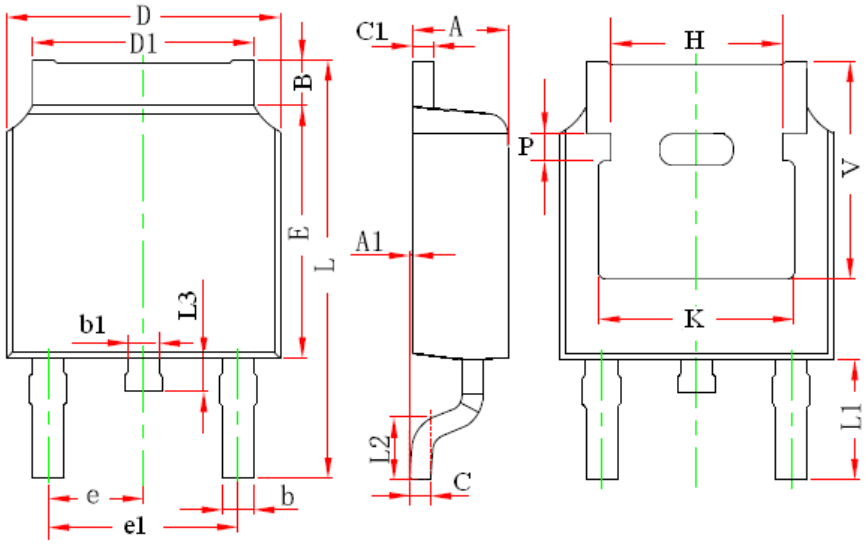
Recommended temperature profile for IR reflow

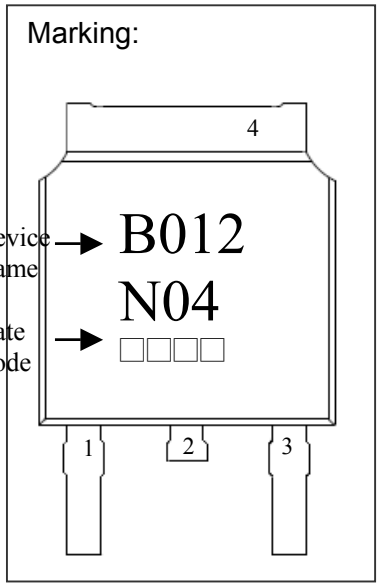


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (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.

TO-252 Dimension





3-Lead TO-252 Plastic Surface Mount Package
CYStek Package Code: J3

Style: Pin 1.Gate 2.Drain 3.Source 4.Drain

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.087	0.094	2.200	2.400	e	0.086	0.094	2.186	2.386
A1	0.000	0.005	0.000	0.127	e1	0.172	0.188	4.372	4.772
B	0.039	0.048	0.990	1.210	H	0.163	REF	4.140	REF
b	0.026	0.034	0.660	0.860	K	0.190	REF	4.830	REF
b1	0.026	0.034	0.660	0.860	L	0.386	0.409	9.800	10.400
C	0.018	0.023	0.460	0.580	L1	0.114	REF	2.900	REF
C1	0.018	0.023	0.460	0.580	L2	0.055	0.067	1.400	1.700
D	0.256	0.264	6.500	6.700	L3	0.024	0.039	0.600	1.000
D1	0.201	0.215	5.100	5.460	P	0.026	REF	0.650	REF
E	0.236	0.244	6.000	6.200	V	0.211	REF	5.350	REF

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.