N -Channel Enhancement Mode Power MOSFET

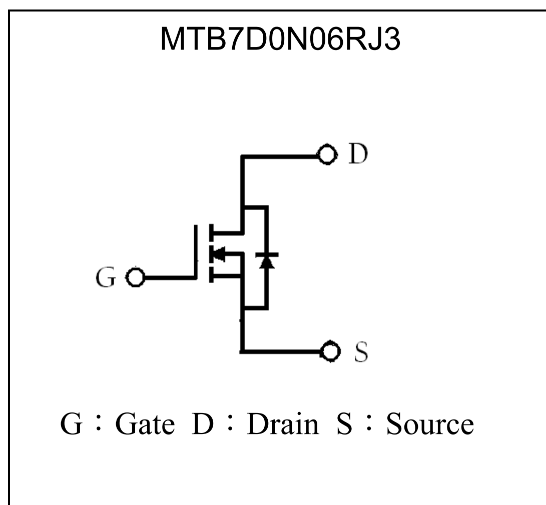
MTB7D0N06RJ3

BV_{DSS}	60V
I_D @V_{GS}=10V, T_C=25°C	56A
$R_{DS(ON)}$@V_{GS}=10V, I_D=20A	6.0mΩ(typ)
$R_{DS(ON)}$@V_{GS}=4.5V, I_D=15A	9.5mΩ(typ)

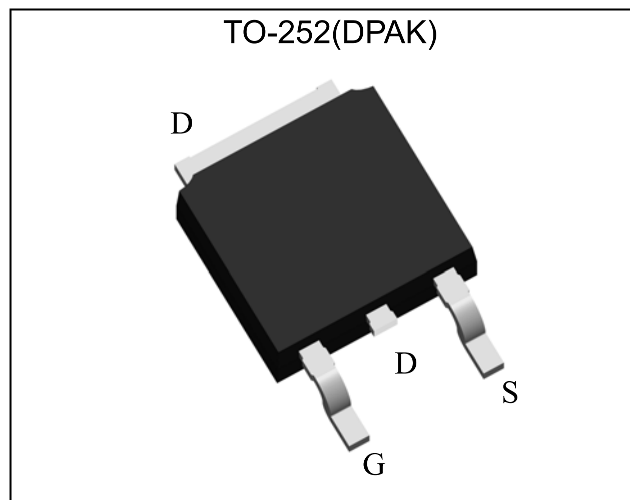
Features

- Low Gate Charge
- Simple Drive Requirement
- Pb-free lead plating and halogen-free package

Equivalent Circuit

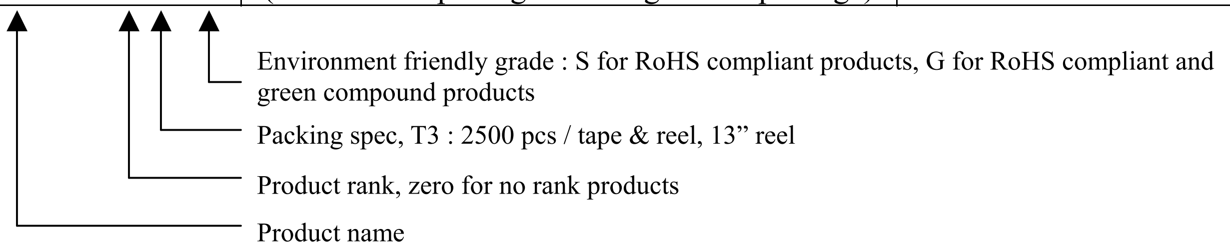


Outline



Ordering Information

Device	Package	Shipping
MTB7D0N06RJ3-0-T3-G	TO-252 (Pb-free lead plating and halogen-free package)	2500 pcs / Tape & Reel



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

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current @ T_C=25°C, V_{GS}=10V		I_D	56	A
Continuous Drain Current @ T_C=100°C, V_{GS}=10V			35.4	
Continuous Drain Current @ T_A=25°C, V_{GS}=10V	*2	I_{DSM}	12.7	
Continuous Drain Current @ T_A=100°C, V_{GS}=10V	*2		8.0	
Continuous Drain Current @ T_A=25°C, V_{GS}=10V	*3		10.2	
Continuous Drain Current @ T_A=100°C, V_{GS}=10V	*3		6.5	
Pulsed Drain Current	*1	I_{DM}	224	
Avalanche Current @L=0.1mH		I_{AS}	48	
Avalanche Energy @ L=1mH, I_D=20A, V_{DD}=25V	*4	E_{AS}	200	mJ
Total Power Dissipation @T_C=25℃		P_D	50	W
Total Power Dissipation @T_C=100℃			20	
Total Power Dissipation @T_A=25℃	*2	P_{DSM}	2.5	
Total Power Dissipation @T_A=100℃	*2		1.0	
Total Power Dissipation @T_A=25℃	*3		1.7	
Total Power Dissipation @T_A=100℃	*3		0.7	
Operating Junction and Storage Temperature Range		Tj, Tstg	-55~+150	°C

Thermal Data

Parameter		Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max		$R_{th,j-c}$	2.5	°C/W
Thermal Resistance, Junction-to-ambient, max	*2	$R_{th,j-a}$	50	
Thermal Resistance, Junction-to-ambient, max	*3		75	

Note : *1. Pulse width limited by maximum junction temperature
*2. When the device is mounted on 1 in² FR-4 board with 2 oz. copper.
*3. When the device is on the minimum pad size recommended.
*4. 100% tested by conditions of L=0.1mH, I_{AS}=20A, V_{GS}=10V, V_{DD}=25V.
*5. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
*6. The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

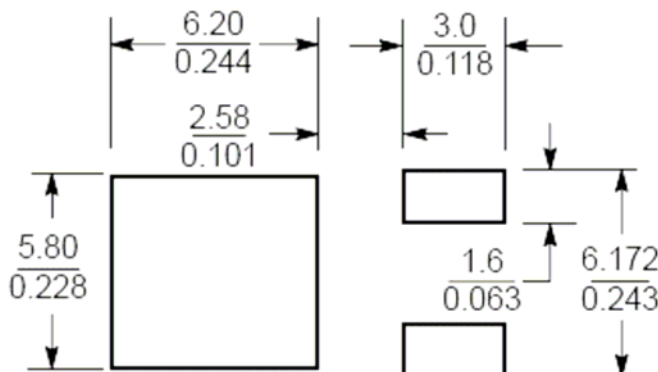
Characteristics (Tc=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	60	-	-	V	V_{GS}=0V, I_D=250μA
$\Delta BV_{DSS}/\Delta Tj$	-	0.03	-	V/°C	Reference to 25°C, I_D=250μA
$V_{GS(th)}$	1	-	2.5	V	V_{DS} =V_{GS}, I_D=250μA
G_{FS} *1	-	21.3	-	S	V_{DS} =5V, I_D=10A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V

I_{DSS}	-	-	1	μA	V_{DS} =48V, V_{GS} =0V
	-	-	25		V_{DS} =48V, V_{GS} =0V, Tj=125°C
$R_{DS(ON)}$ *1	-	6.0	8	mΩ	V_{GS} =10V, I_D=20A
	-	9.5	13.5		V_{GS} =4.5V, I_D=15A
Dynamic					
Qg *1, 2	-	46.9	-	nC	V_{DS}=48V, V_{GS}=10V, I_D=20A
Qgs *1, 2	-	9.5	-		
Qgd *1, 2	-	9.6	-		
$t_{d(ON)}$ *1, 2	-	17.6	-	ns	V_{DS}=30V, I_D=20A, V_{GS}=10V, R_{GS}=3Ω
tr *1, 2	-	17.4	-		
$t_{d(OFF)}$ *1, 2	-	54.6	-		
t_f *1, 2	-	10	-		
Ciss	-	2751	-	pF	V_{GS}=0V, V_{DS}=30V, f=1MHz
Coss	-	358	-		
Crss	-	41	-		
Rg	-	1.8	-	Ω	f=1MHz
Source-Drain Diode					
I_S *1	-	-	40	A	
I_{SM} *3	-	-	160		
V_{SD} *1	-	0.87	1.2	V	I_S=20A, V_{GS}=0V
trr	-	23.5	-	ns	I_F=20A, dI_F/dt=100A/μs
Qrr	-	18.5	-	nC	

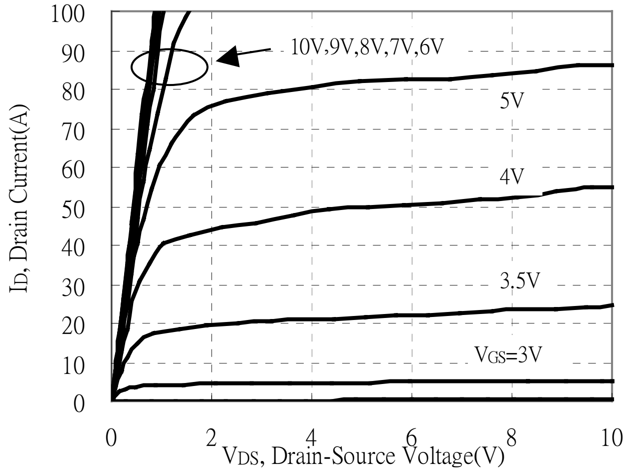
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
*2.Independent of operating temperature
*3.Pulse width limited by maximum junction temperature.

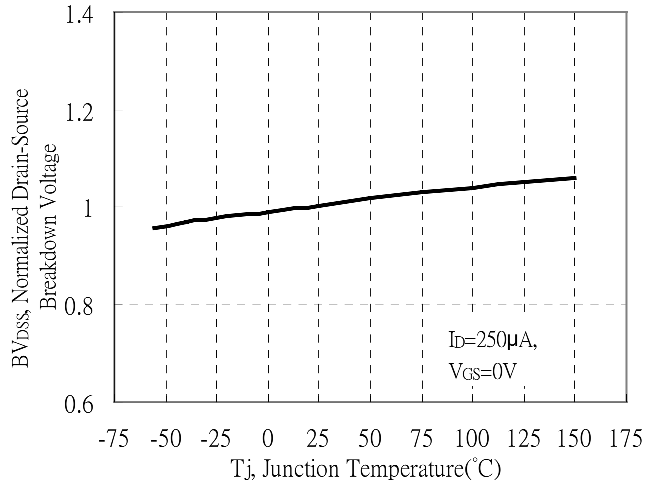
Recommended soldering footprint

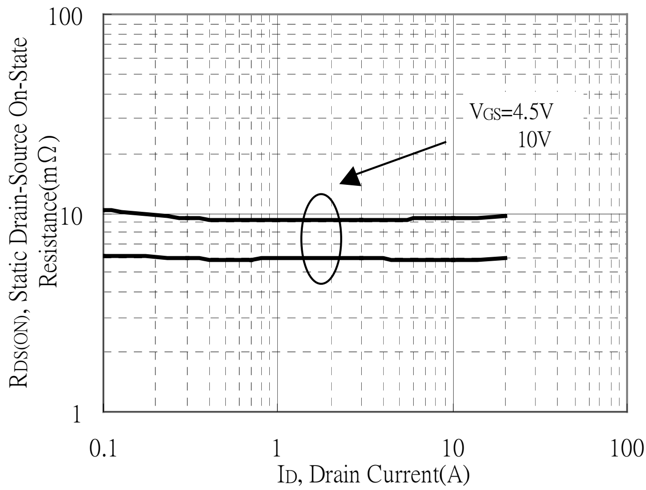


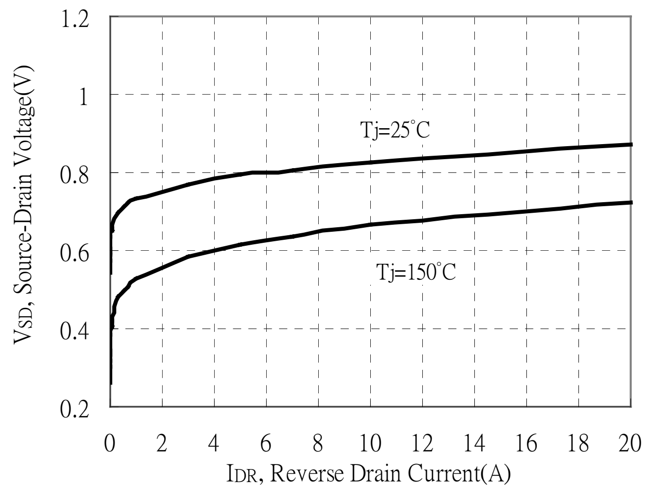
Unit (mm / inch)

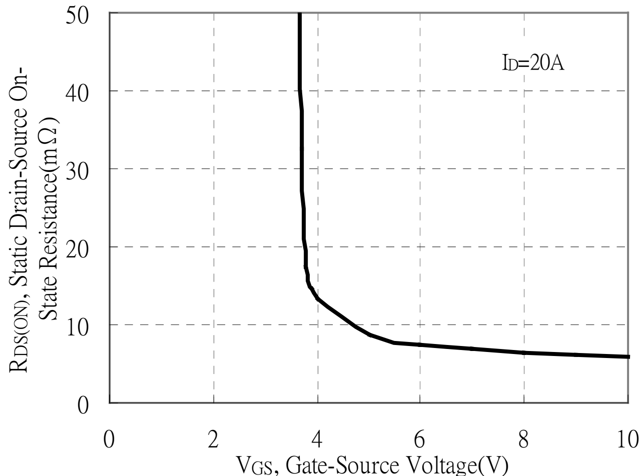
Typical Characteristics

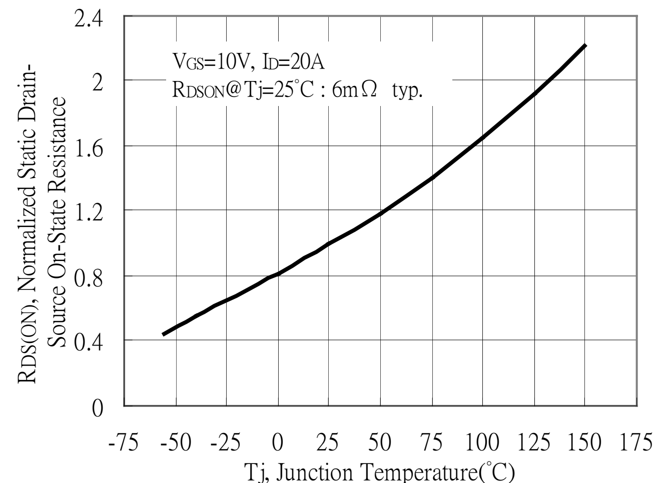




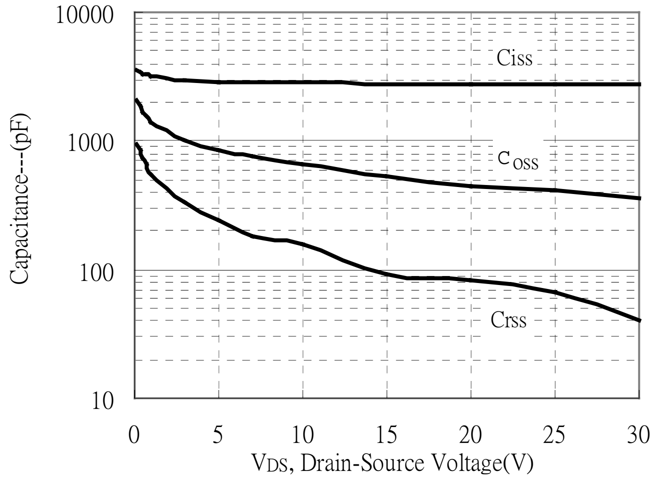


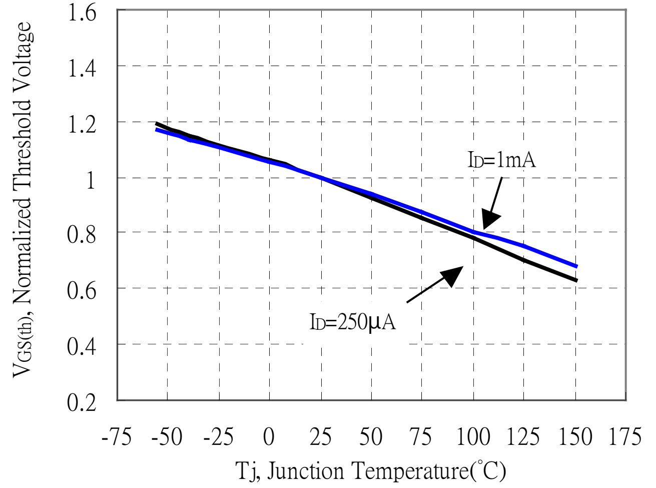


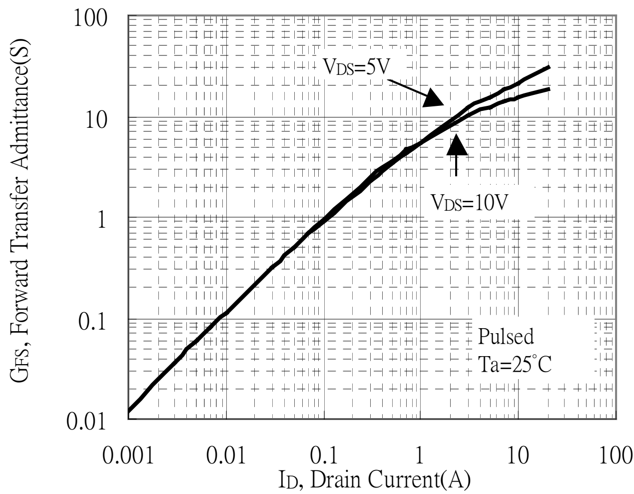


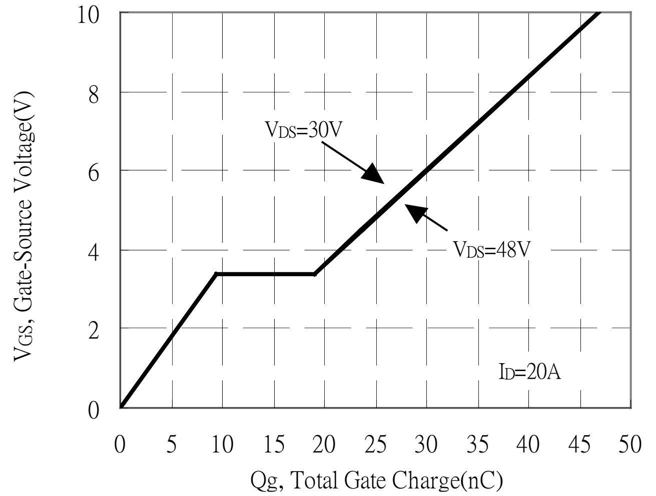


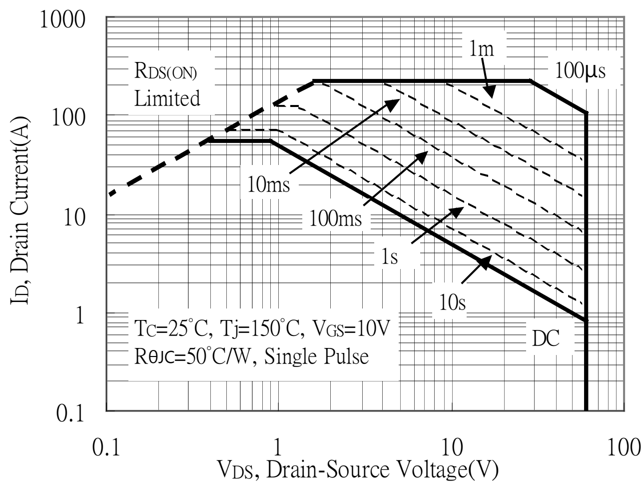
Typical Characteristics(Cont.)

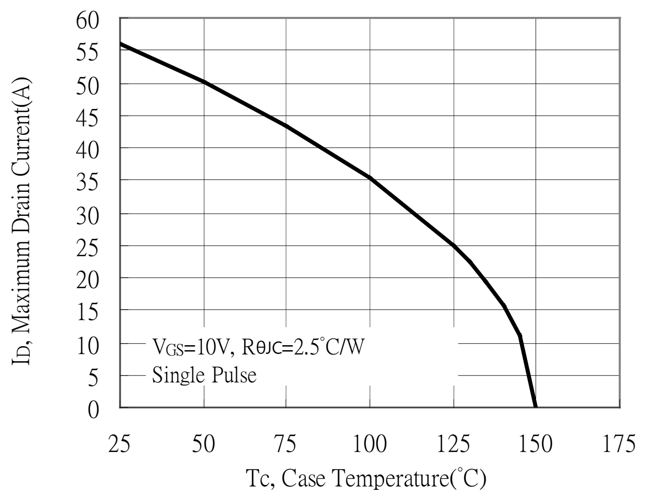












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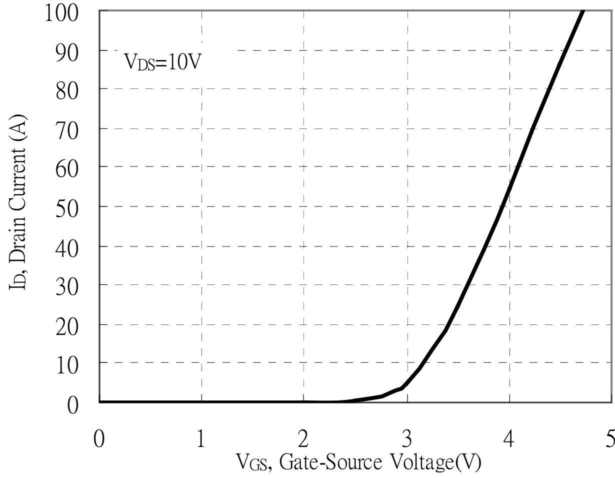
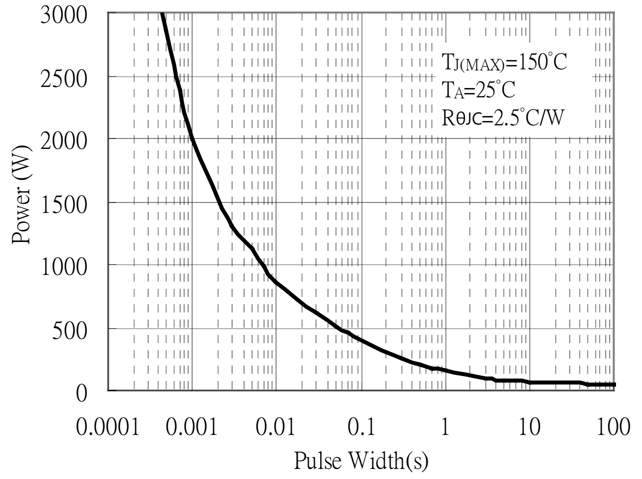
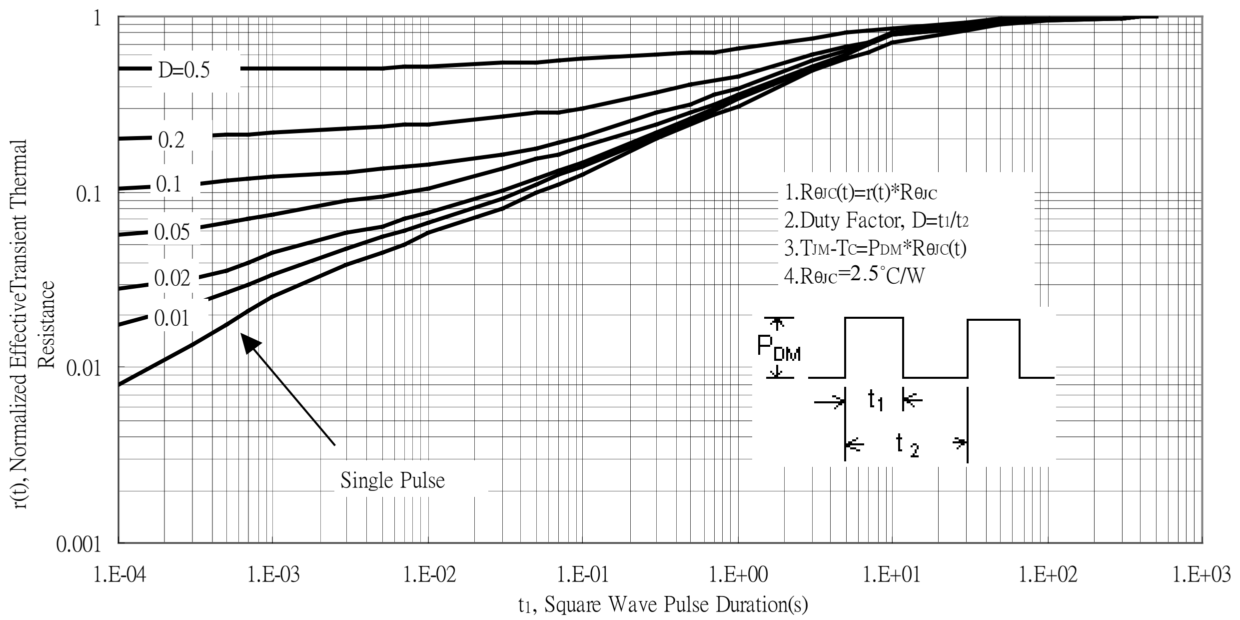
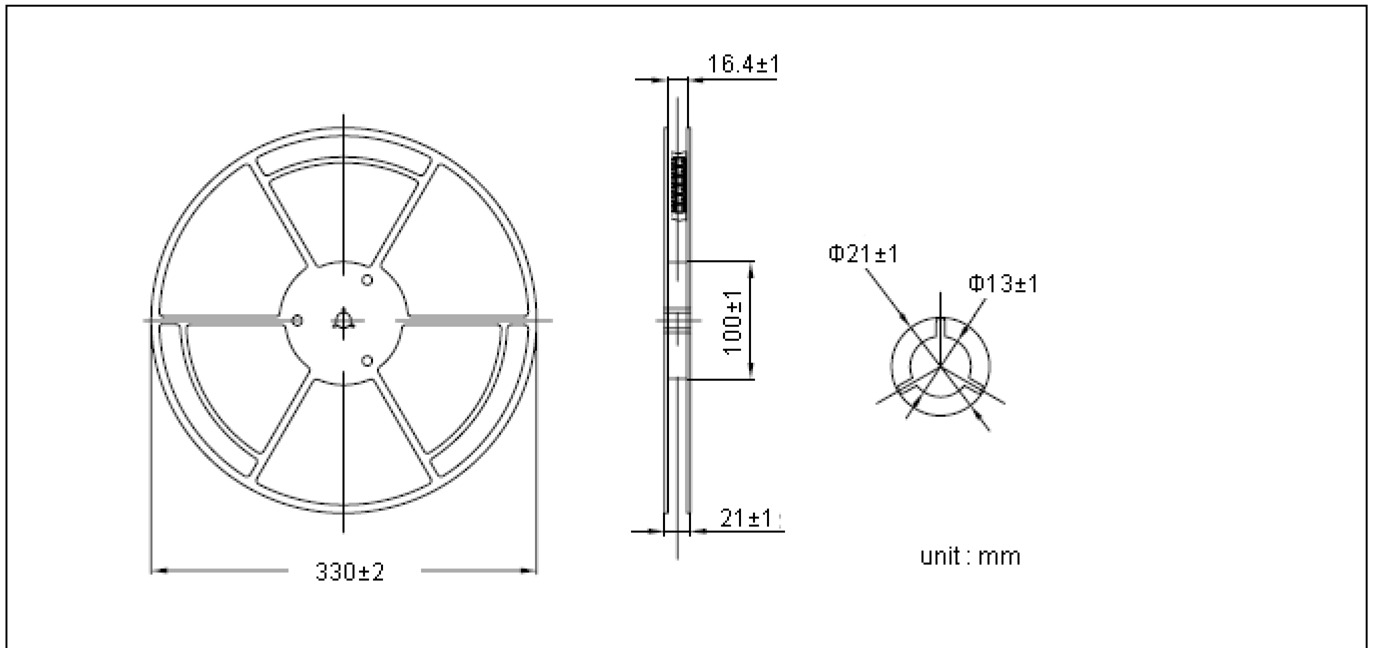


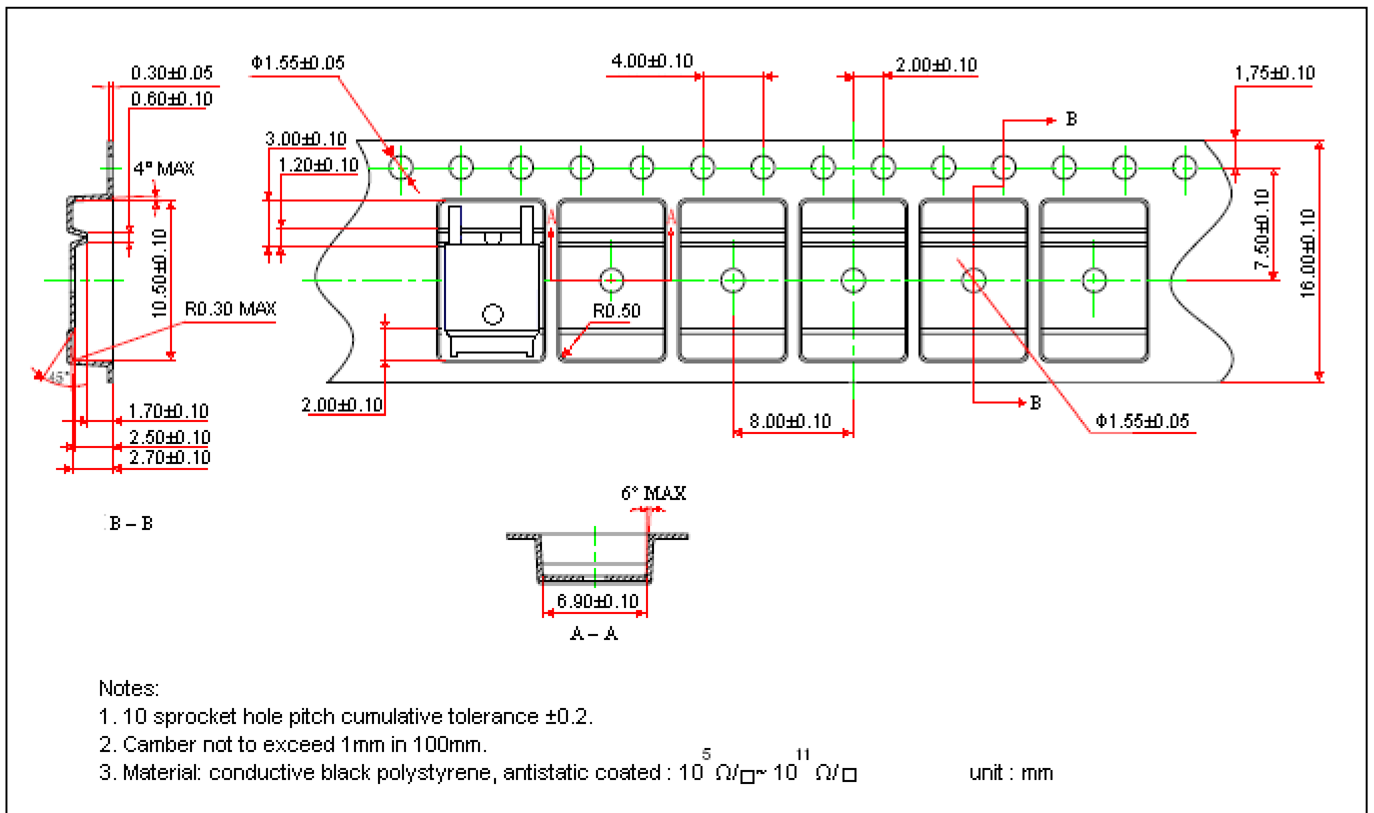




Reel Dimension



Carrier Tape Dimension



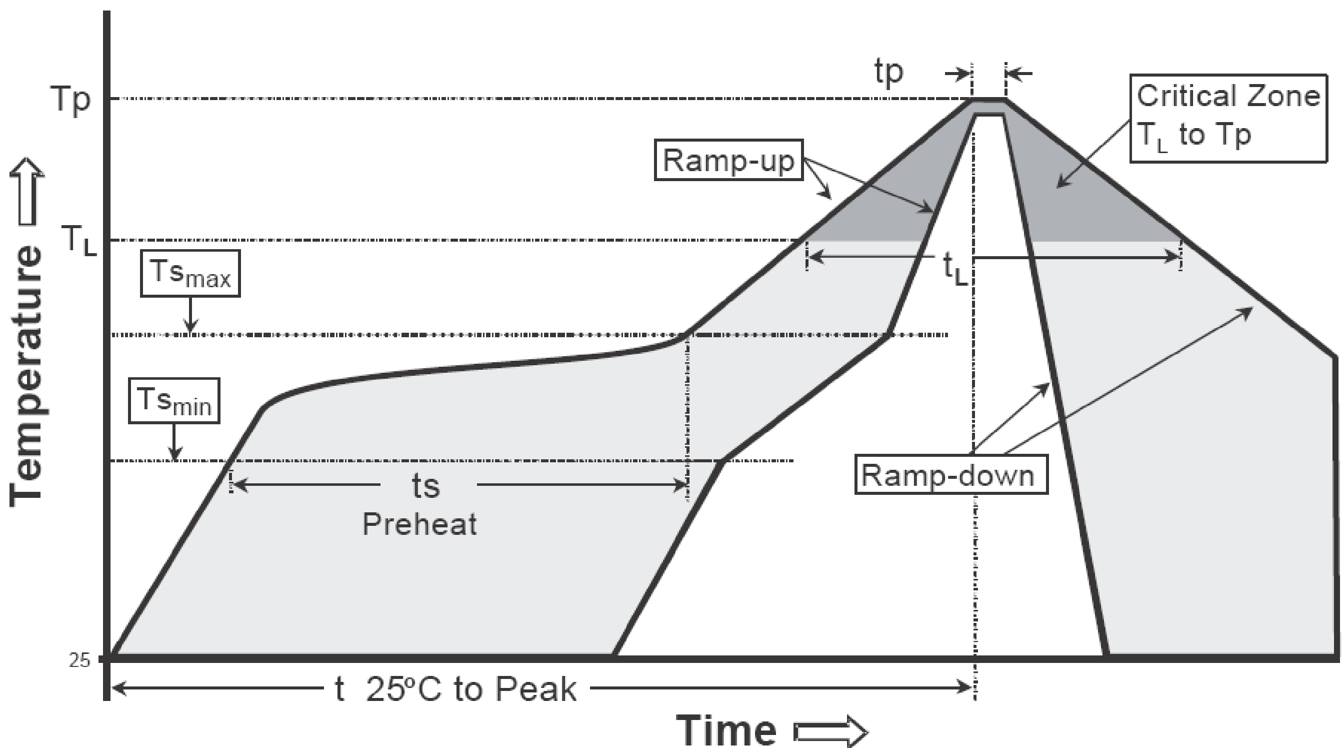
Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene, antistatic coated : 10^5 Ω/□~ 10^{11} Ω/□

unit : mm

Recommended wave soldering condition

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

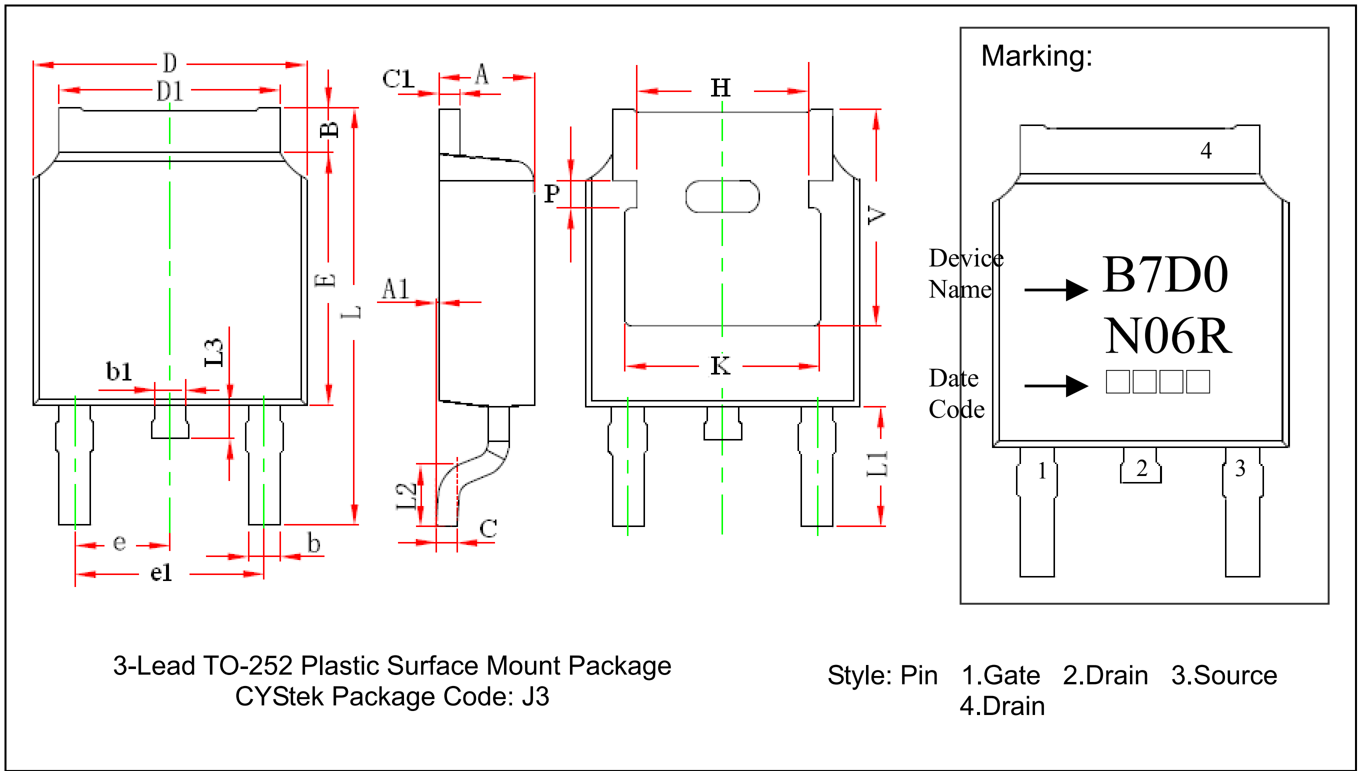
Recommended temperature profile for IR reflow



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(ts_{min} to ts_{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.

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