

N-Channel Enhancement Mode Power MOSFET

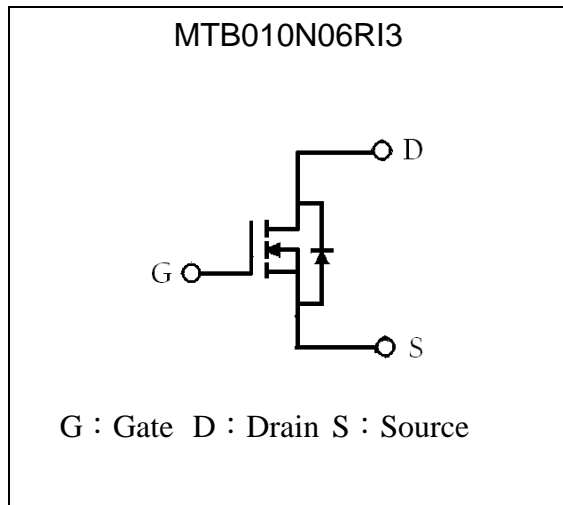
MTB010N06RI3

BV_{DSS}	60V
I_D@V_{GS}=10V, T_C=25°C	43A
R_{DS(ON)}@V_{GS}=10V, I_D=20A	10.7 mΩ (typ)
R_{DS(ON)}@V_{GS}=4.5V, I_D=20A	30 mΩ (typ)

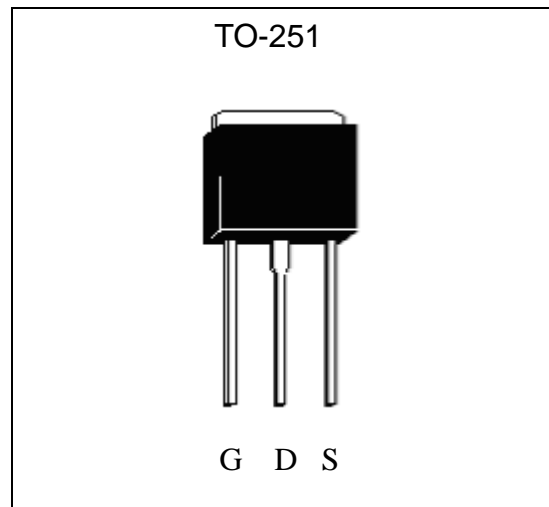
Features

- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free package

Symbol

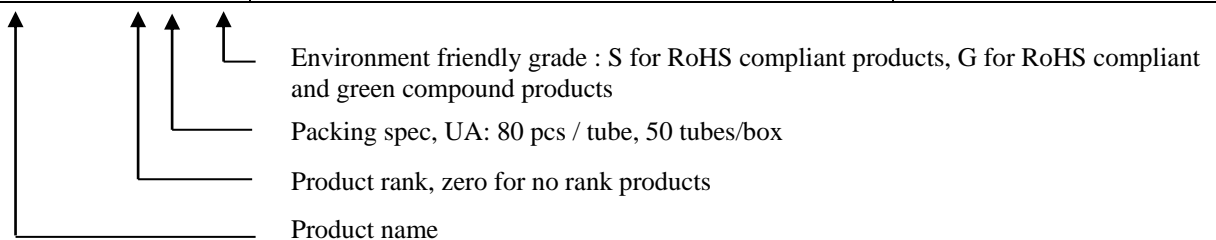


Outline



Ordering Information

Device	Package	Shipping
MTB010N06RI3-0-UA-G	TO-251 (Pb-free lead plating and halogen-free package)	80 pcs/tube, 50 tubes/box





Absolute Maximum Ratings ($T_C=25^{\circ}C$)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage (Note 1)		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current @ $T_C=25^{\circ}C$, $V_{GS}=10V$ (Note 1)		I_D	43	A
Continuous Drain Current @ $T_C=100^{\circ}C$, $V_{GS}=10V$ (Note 1)			30.4	
Continuous Drain Current @ $T_A=25^{\circ}C$, $V_{GS}=10V$ (Note 4)		I_{DSM}	9.8	
Continuous Drain Current @ $T_A=70^{\circ}C$, $V_{GS}=10V$ (Note 4)			7.8	
Pulsed Drain Current @ $V_{GS}=10V$ (Note 3)		I_{DM}	172	
Avalanche Current (Note 3)		I_{AS}	32	
Single Pulse Avalanche Energy @ $L=0.1mH$, $I_D=32A$, $V_{DD}=30V$ (Note 2&5)		E_{AS}	51	mJ
Repetitive Avalanche Energy (Note 3)		E_{AR}	5	
Power Dissipation	$T_C=25^{\circ}C$ (Note 1)	P_D	50	W
	$T_C=100^{\circ}C$ (Note 1)		25	
	$T_A=25^{\circ}C$ (Note 4)	P_{DSM}	3	
	$T_A=70^{\circ}C$ (Note 4)		0.96	
Operating Junction and Storage Temperature		T_j, T_{stg}	-55~+175	$^{\circ}C$

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	3	$^{\circ}C/W$
Thermal Resistance, Junction-to-ambient, max	$R_{\theta JA}$	50 (Note 4)	
		110	

- Note :
1. The power dissipation P_D is based on $T_{J(MAX)}=175^{\circ}C$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
 2. The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of $150^{\circ}C$. The value in any given application depends on the user's specific board design.
 3. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=175^{\circ}C$. Ratings are based on low frequency and low duty cycles to keep initial $T_J=25^{\circ}C$.
 4. When the device is mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with $T_A=25^{\circ}C$. The value in any given application depends on the user's specific board design.
 5. 100% tested by conditions of $L=0.1mH$, $V_{GS}=10V$, $I_{AS}=10A$, $V_{DD}=30V$



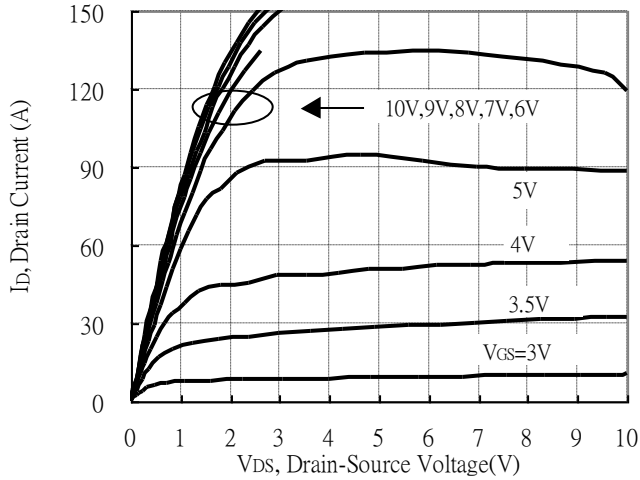
Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	60	-	-	V	V _{GS} =0V, I _D =250μA
ΔBV _{DSS} /ΔT _j	-	0.04	-	V/°C	Reference to 25°C, I _D =250μA
V _{GS(th)}	1.0	-	2.5	V	V _{DS} = V _{GS} , I _D =250μA
*G _{FS}	-	10.2	-	S	V _{DS} = 10V, I _D =5A
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =48V, V _{GS} =0V
	-	-	10		V _{DS} =48V, V _{GS} =0V, T _j =125°C
*R _{DS(ON)}	-	10.7	14.5	mΩ	V _{GS} =10V, I _D =20A
	-	30	42		V _{GS} =4.5V, I _D =20A
Dynamic					
*Q _g	-	25.9	-	nC	V _{DD} =48V, I _D =15A, V _{GS} =10V
*Q _{gs}	-	5.1	-		
*Q _{gd}	-	4.6	-		
*t _{d(ON)}	-	13	-	ns	V _{DD} =30V, I _D =15A, V _{GS} =10V, R _G =6Ω
*t _r	-	14.2	-		
*t _{d(OFF)}	-	42.2	-		
*t _f	-	8	-		
C _{iss}	-	1557	-	pF	V _{GS} =0V, V _{DS} =30V, f=1MHz
C _{oss}	-	179	-		
C _{rss}	-	27	-		
R _g	-	1.5	-	Ω	f=1MHz
Source-Drain Diode					
*I _S	-	-	43	A	
*I _{SM}	-	-	172		
*V _{SD}	-	0.74	1	V	I _S =1A, V _{GS} =0V
*t _{rr}	-	16.8	-	ns	V _{GS} =0V, I _F =15A, dI _F /dt=100A/μs
*Q _{rr}	-	10.4	-	nC	

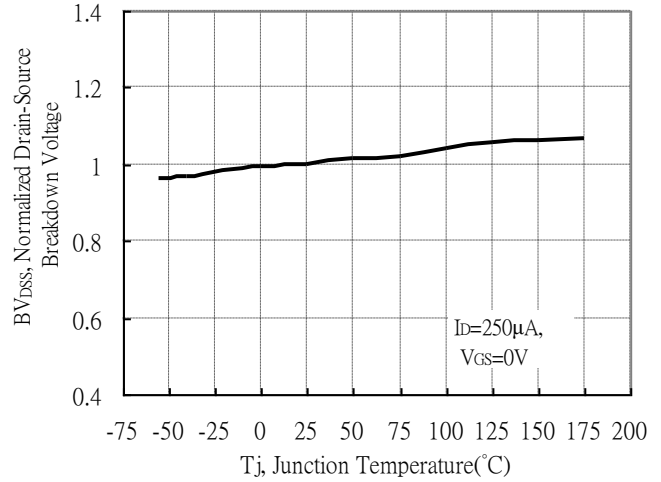
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Typical Characteristics

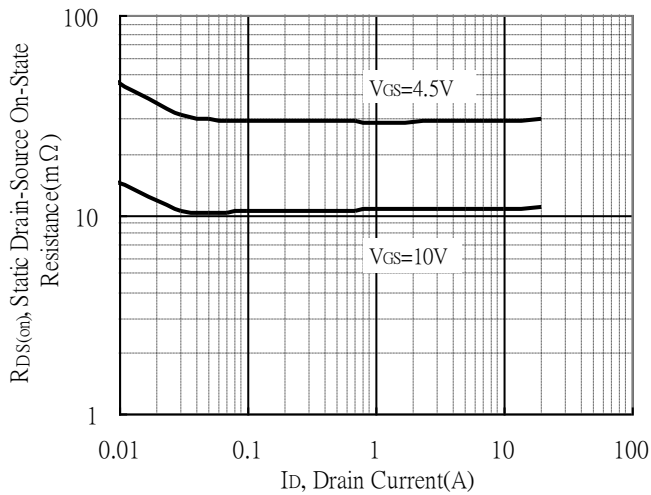
Typical Output Characteristics



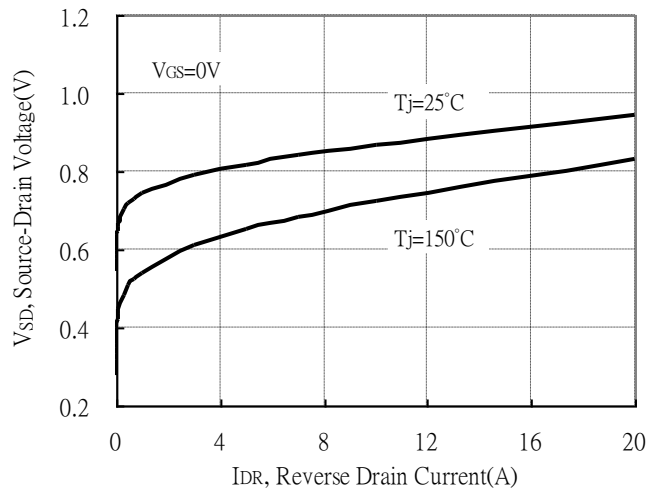
Brekdown Voltage vs Ambient Temperature



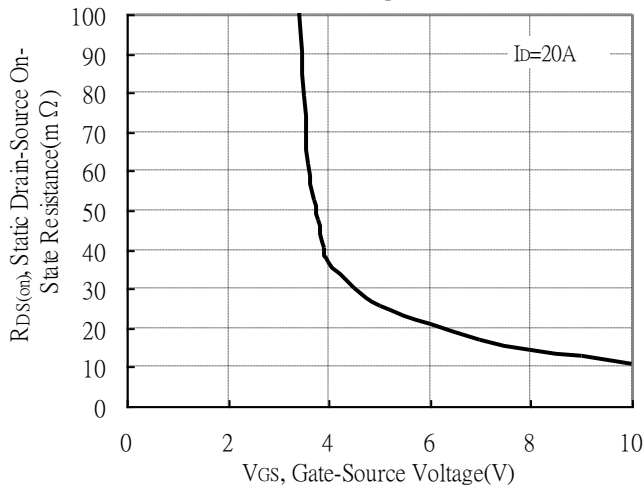
Static Drain-Source On-State resistance vs Drain Current



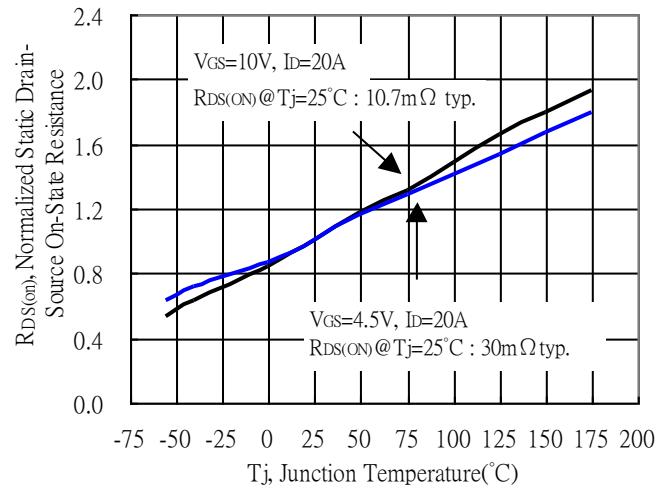
Reverse Drain Current vs Source-Drain Voltage



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

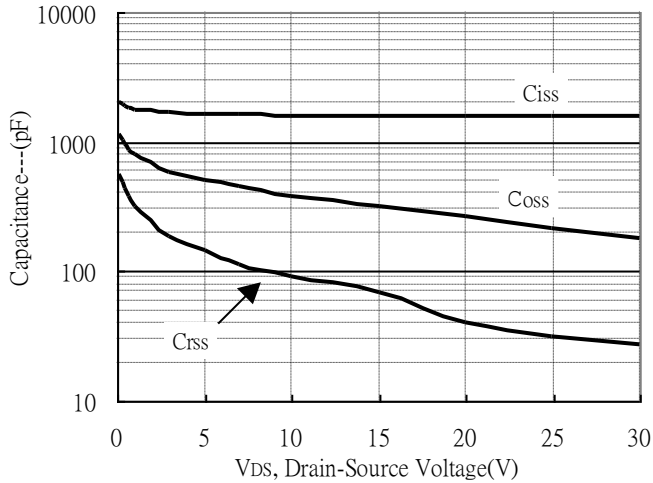


Drain-Source On-State Resistance vs Junction Temperature

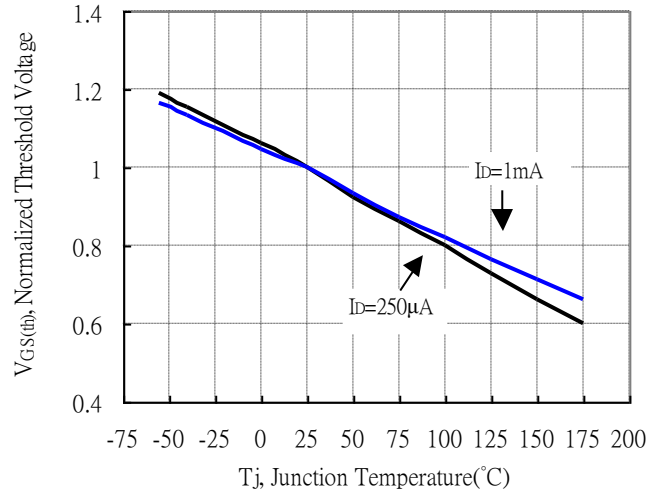


Typical Characteristics(Cont.)

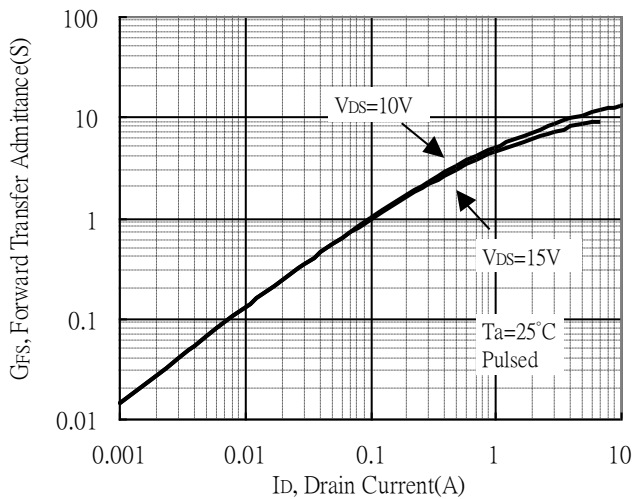
Capacitance vs Drain-to-Source Voltage



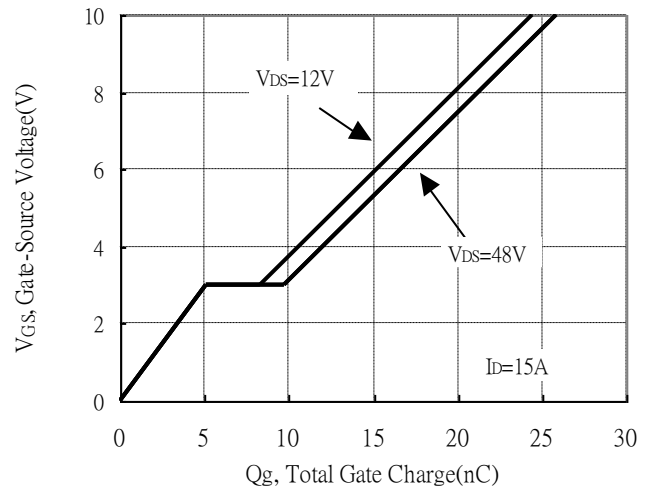
Threshold Voltage vs Junction Temperature



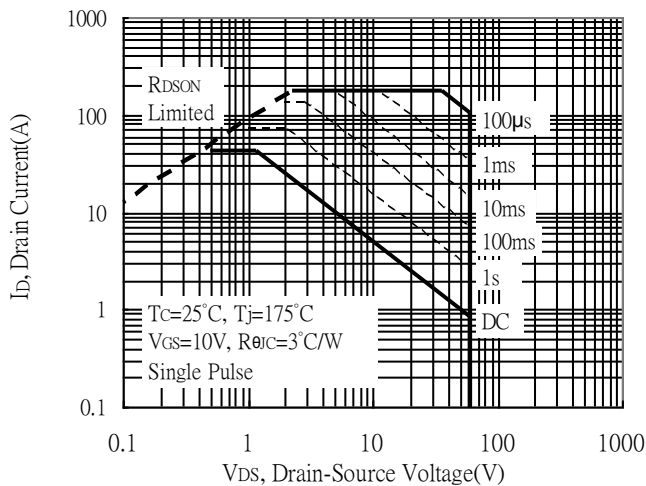
Forward Transfer Admittance vs Drain Current



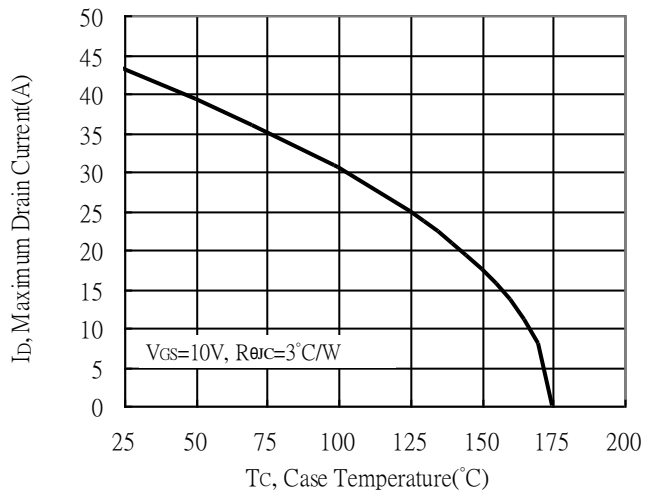
Gate Charge Characteristics



Maximum Safe Operating Area

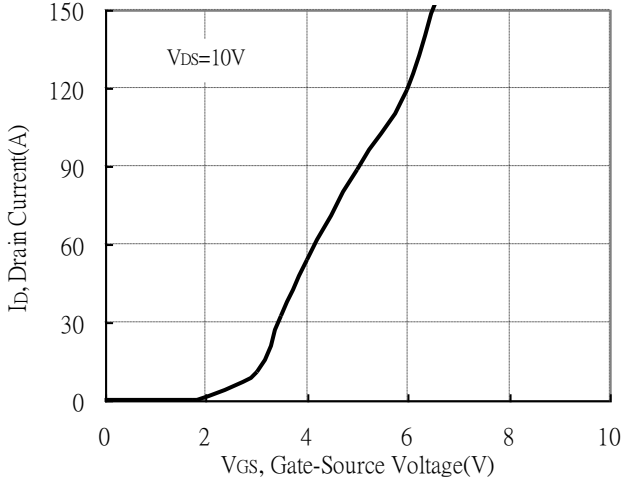


Maximum Drain Current vs Case Temperature

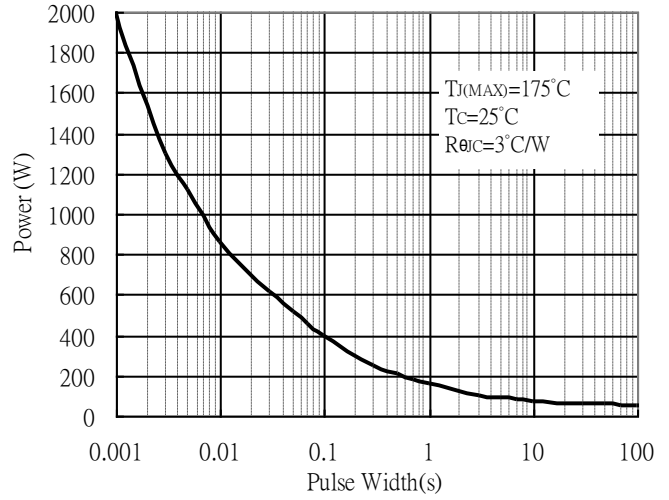


Typical Characteristics(Cont.)

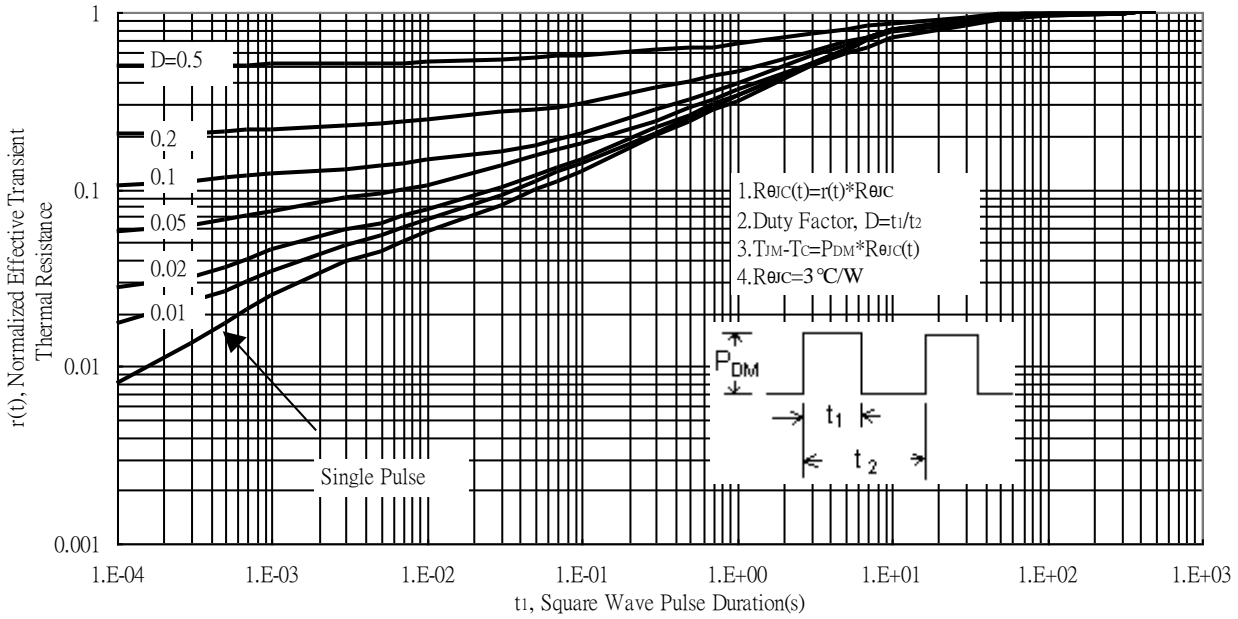
Typical Transfer Characteristics



Single Pulse Power Rating, Junction to Case



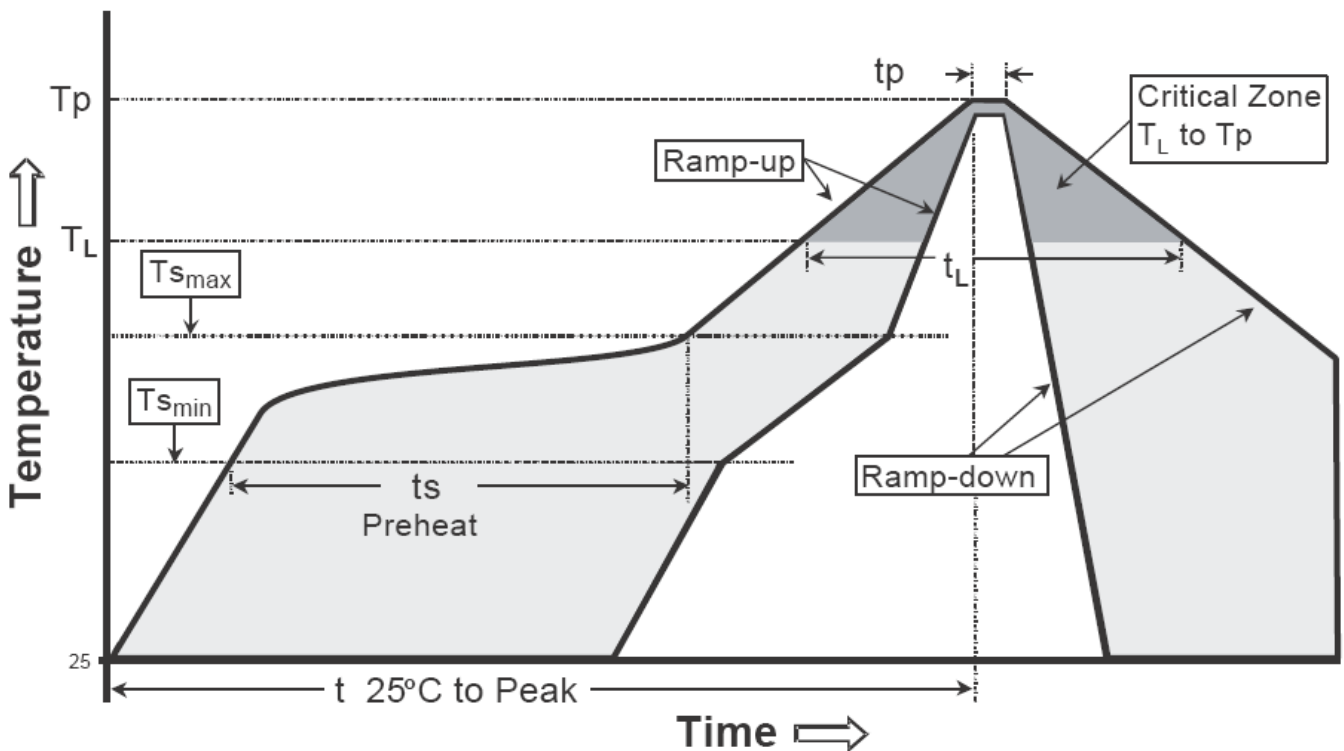
Transient Thermal Response Curves



Recommended wave soldering condition

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

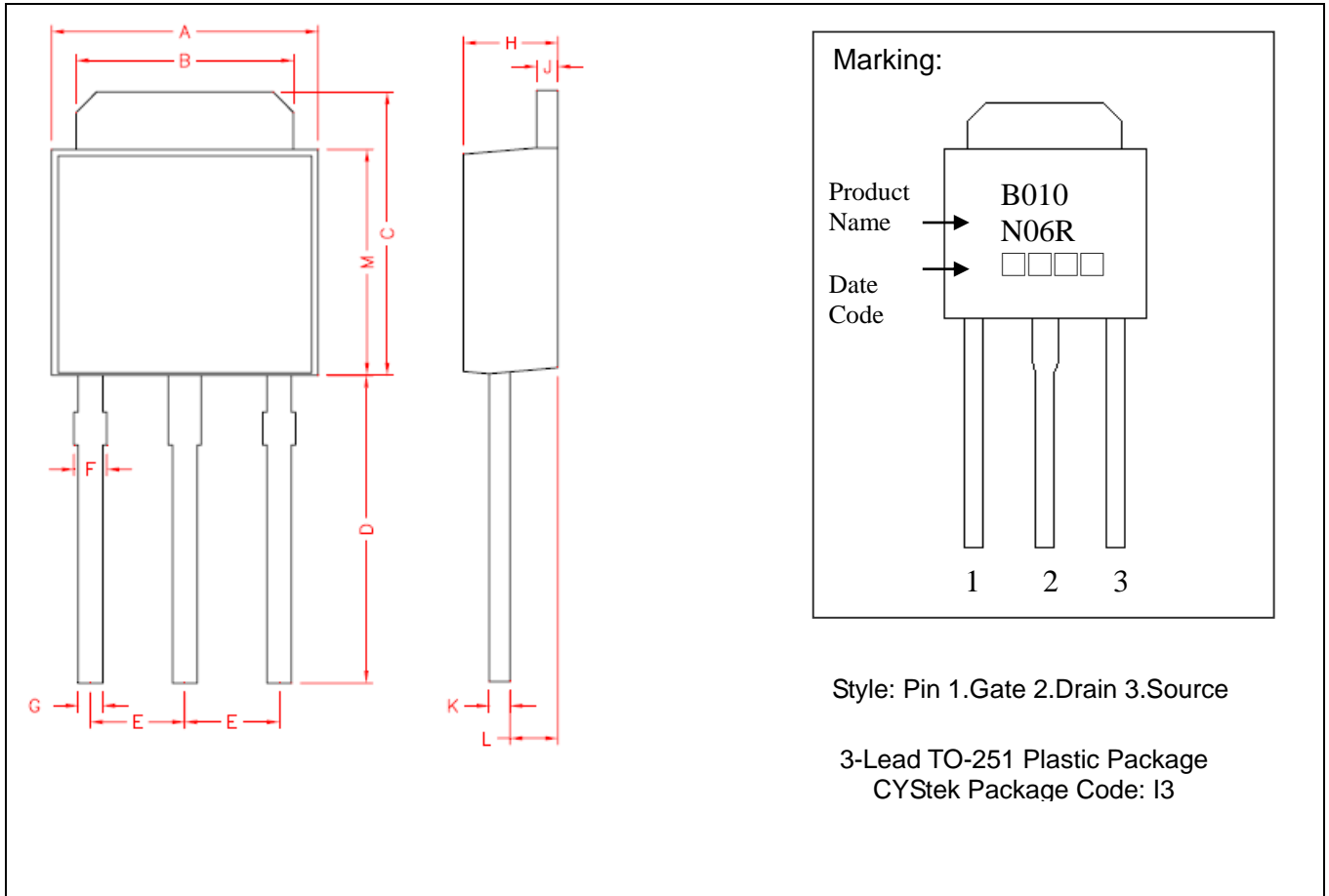
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T _{s min})	100°C	150°C
-Temperature Max(T _{s max})	150°C	200°C
-Time(t _{s min} to t _{s max})	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T _L)	183°C	217°C
- Time (t _L)	60-150 seconds	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-251 Dimension



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	6.40	6.80	0.252	0.268	G	0.50	0.70	0.020	0.028
B	5.20	5.50	0.205	0.217	H	2.20	2.40	0.087	0.094
C	6.80	7.20	0.268	0.283	J	0.45	0.55	0.018	0.022
D	7.20	7.80	0.283	0.307	K	0.45	0.60	0.018	0.024
E	2.30 REF		0.091 REF		L	0.90	1.50	0.035	0.059
F	0.60	0.90	0.024	0.035	M	5.40	5.80	0.213	0.228

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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