

# N-Channel Logic Level Enhancement Mode Power MOSFET

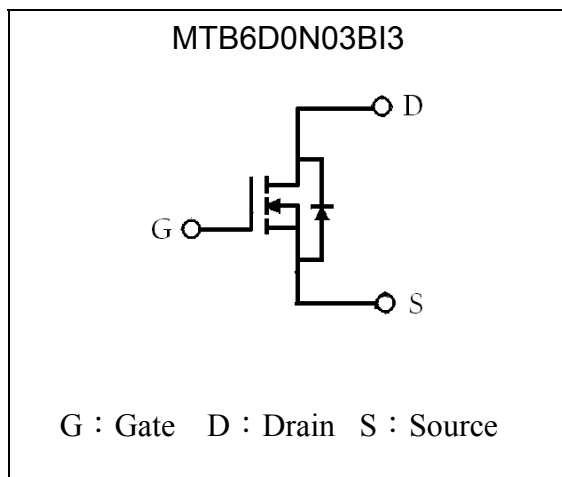
## MTB6D0N03BI3

$BV_{DSS}$	30V	
$I_D @ V_{GS}=10V, T_A=25^\circ C$	12A	
$I_D @ V_{GS}=10V, T_C=25^\circ C$	44A	
$R_{DS(on)(TYP)}$	$V_{GS}=10V, I_D=25A$	7.1m $\Omega$
	$V_{GS}=4.5V, I_D=15A$	10.0m $\Omega$

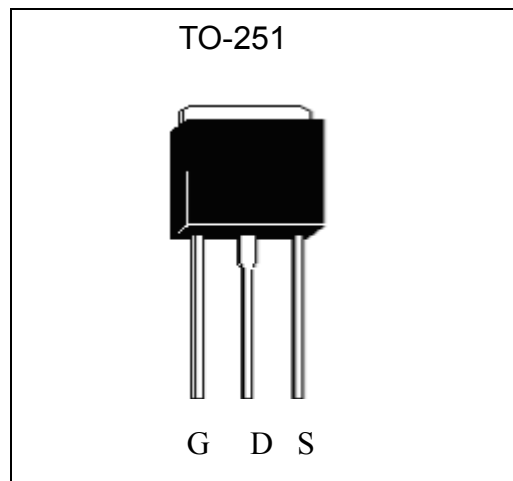
### Features

- Single Drive Requirement
- Low On-resistance
- Fast Switching Characteristic
- Repetitive Avalanche Rated
- Pb-free lead plating and halogen-free package

### Equivalent Circuit

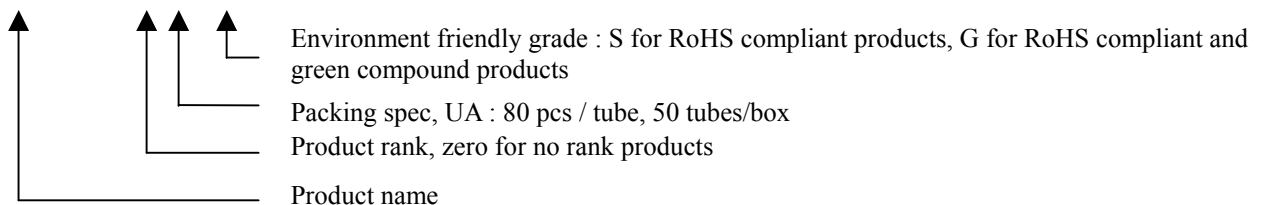


### Outline



### Ordering Information

Device	Package	Shipping
MTB6D0N03BI3-0-UA-G	TO-251 (RoHS compliant and halogen-free package)	80 pcs/tube, 50 tubes/box





**Absolute Maximum Ratings** (Ta=25°C, unless otherwise specified)

Parameter	Symbol	Limits	Unit	
Drain-Source Voltage	V <sub>DS</sub>	30	V	
Gate-Source Voltage	V <sub>GS</sub>	±20		
Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>C</sub> =25°C	I <sub>D</sub>	44	A	
Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>C</sub> =100°C		28		
Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>A</sub> =25°C		12		
Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>A</sub> =70°C		9.6		
Pulsed Drain Current	I <sub>DM</sub>	176 *1		
Avalanche Energy @ L=0.1mH, I <sub>D</sub> =30A, V <sub>DD</sub> =15V	E <sub>AS</sub>	45 *3	mJ	
Repetitive Avalanche Energy @ L=0.05mH	E <sub>AR</sub>	3.3		
Total Power Dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C	33	W
		T <sub>C</sub> =100°C	13.2	
	P <sub>DSM</sub>	T <sub>A</sub> =25°C	2.5 *2	
		T <sub>A</sub> =70°C	1.6 *2	
Operating Junction and Storage Temperature Range	T <sub>j</sub> , T <sub>stg</sub>	-55~+150	°C	

**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R <sub>θJC</sub>	3.8	°C/W
Thermal Resistance, Junction-to-ambient, max	R <sub>θJA</sub>	50 *2	

- Note : 1. Pulse width limited by maximum junction temperature.  
 2. Surface mounted on a 1 in<sup>2</sup> pad of 2oz copper. In practice R<sub>thj-a</sub> will be determined by customer's PCB characteristics. 125°C/W when mounted on a minimum pad of 2 oz. copper.  
 3. 100% tested by conditions of L=0.1mH, I<sub>AS</sub>=10A, V<sub>GS</sub>=10V, V<sub>DD</sub>=15V, rated 30V

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	30	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	1	-	2.5		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA
G <sub>FS</sub> *1	-	25	-	S	V <sub>DS</sub> =5V, I <sub>D</sub> =15A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V
I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V
	-	-	10		V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>j</sub> =85°C
R <sub>DS(ON)</sub> *1	-	7.1	9	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =25A
	-	10	15		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A
<b>Dynamic</b>					
C <sub>iss</sub>	-	803	-	pF	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz
C <sub>oss</sub>	-	186	-		
C <sub>rss</sub>	-	106	-		
Q <sub>g</sub> *1, 2	-	8	-	nC	V <sub>DS</sub> =20V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =33A
Q <sub>gs</sub> *1, 2	-	2.5	-		
Q <sub>gd</sub> *1, 2	-	3.8	-		



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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
t <sub>d(ON)</sub> *1, 2	-	7.6	-	ns	V <sub>DS</sub> =15V, I <sub>D</sub> =33A, V <sub>GS</sub> =10V, R <sub>GS</sub> =3.3 Ω
t <sub>r</sub> *1, 2	-	12.6	-		
t <sub>d(OFF)</sub> *1, 2	-	26.2	-		
t <sub>f</sub> *1, 2	-	7.8	-		
R <sub>g</sub>	-	1.9	-	Ω	f=1MHz

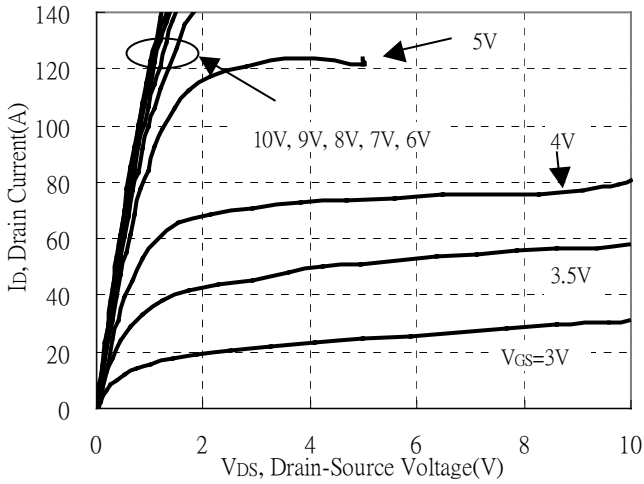
**Source-Drain Diode**

I <sub>S</sub> *1	-	-	44	A	
I <sub>SM</sub> *3	-	-	176		
V <sub>SD</sub> *1	-	0.88	1.3	V	I <sub>S</sub> =25A, V <sub>GS</sub> =0V
t <sub>rr</sub>	-	11	-	ns	I <sub>F</sub> =20A, dI <sub>F</sub> /dt=100A/μs
Q <sub>rr</sub>	-	5.1	-	nC	

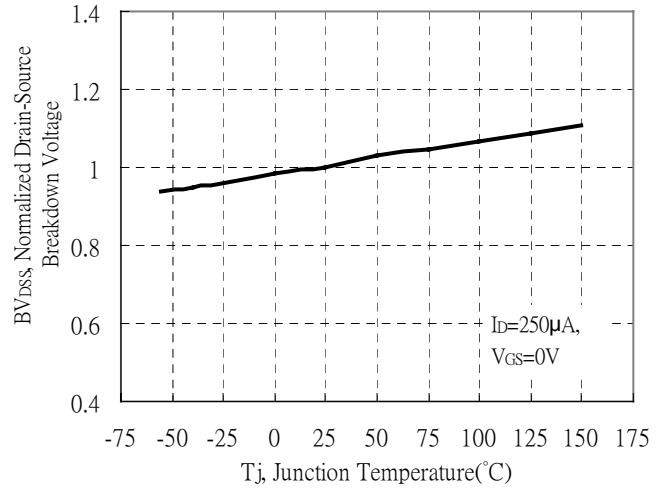
Note : \*1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%  
\*2.Independent of operating temperature  
\*3.Pulse width limited by maximum junction temperature.

**Typical Characteristics**

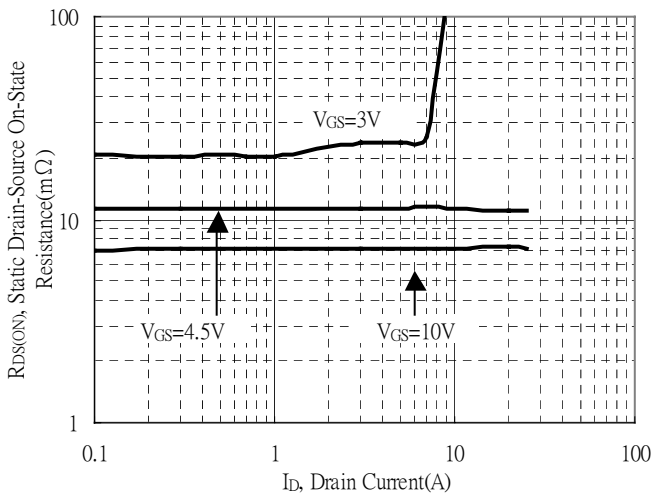
Typical Output Characteristics



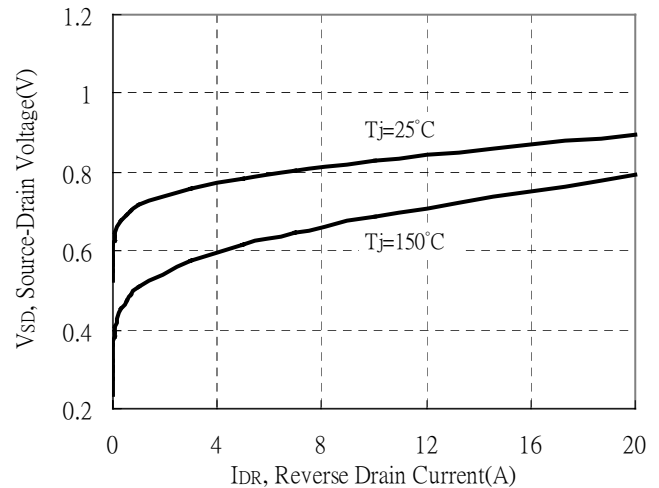
Brekdown Voltage vs Ambient Temperature



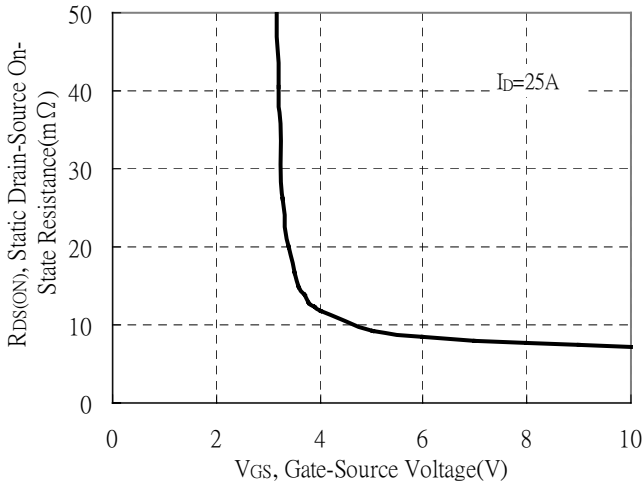
Static Drain-Source On-State resistance vs Drain Current



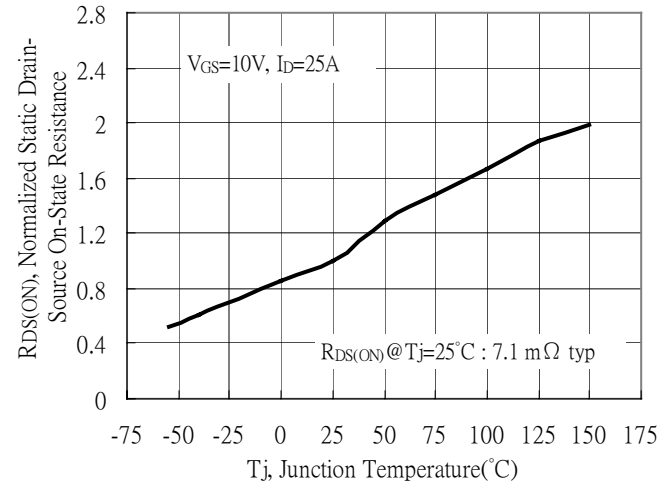
Reverse Drain Current vs Source-Drain Voltage



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

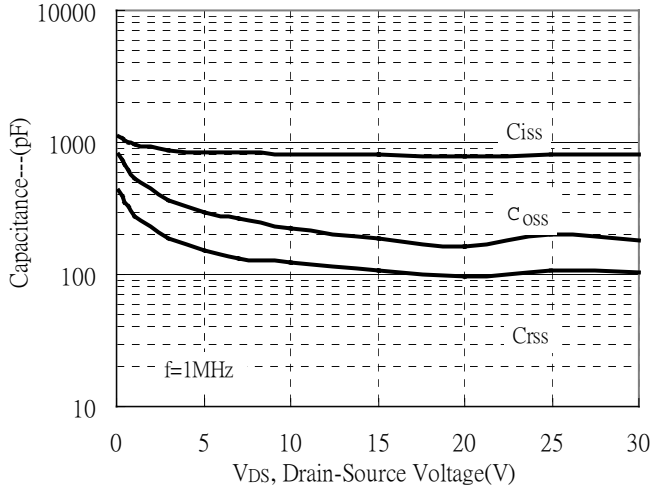


Drain-Source On-State Resistance vs Junction Temperature

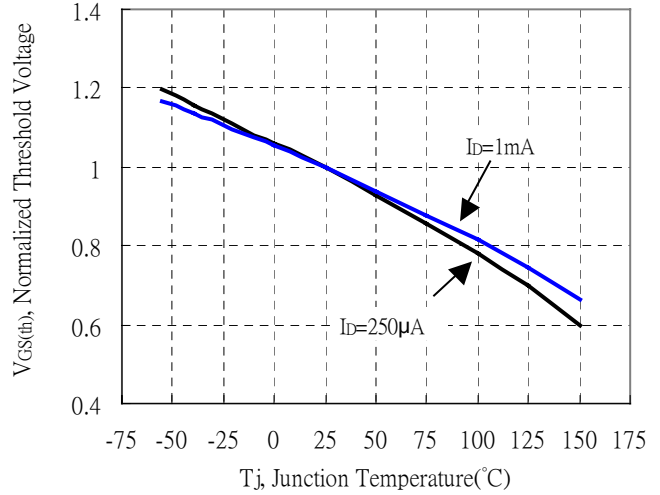


**Typical Characteristics(Cont.)**

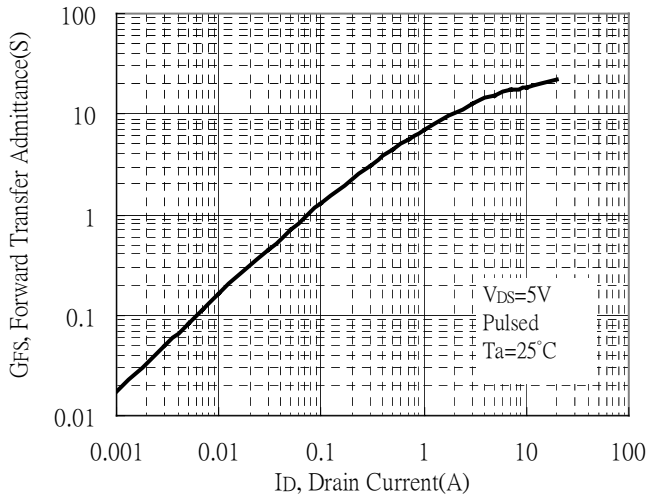
Capacitance vs Drain-to-Source Voltage



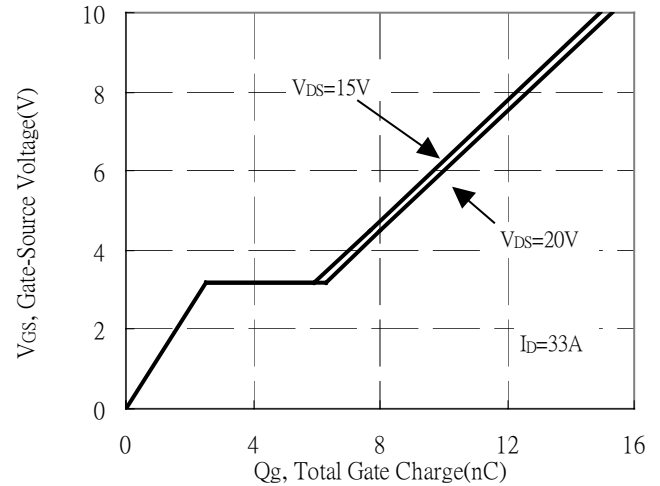
Threshold Voltage vs Junction Temperature



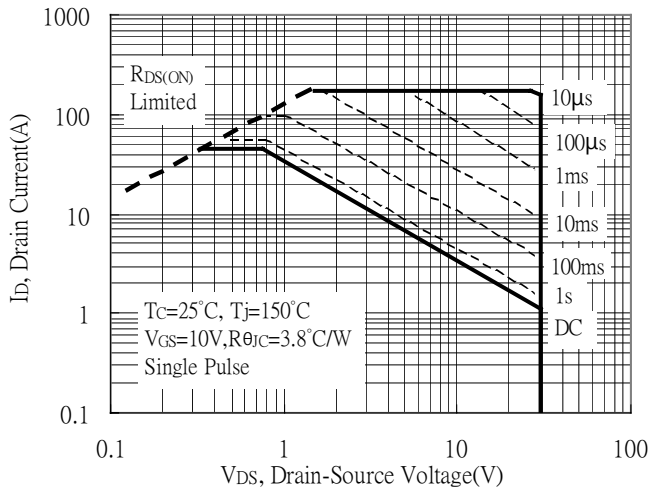
Forward Transfer Admittance vs Drain Current



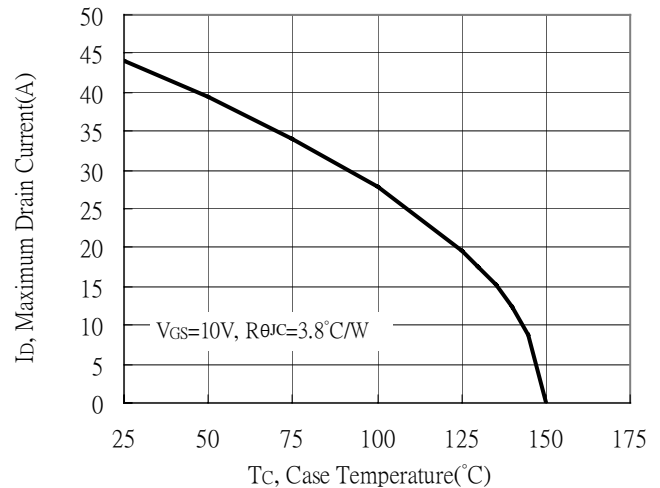
Gate Charge Characteristics



Maximum Safe Operating Area



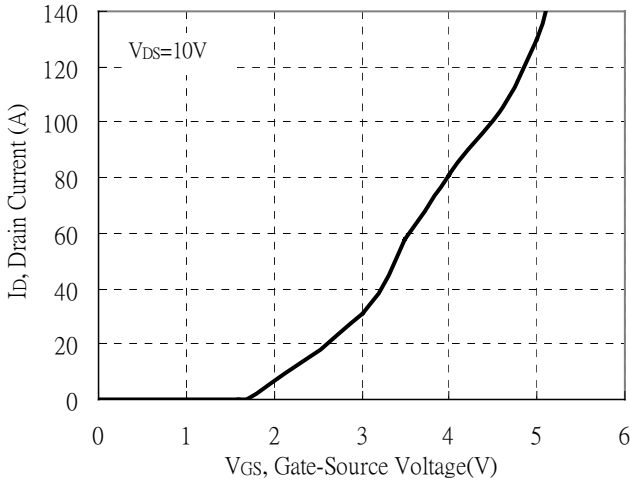
Maximum Drain Current vs Case Temperature



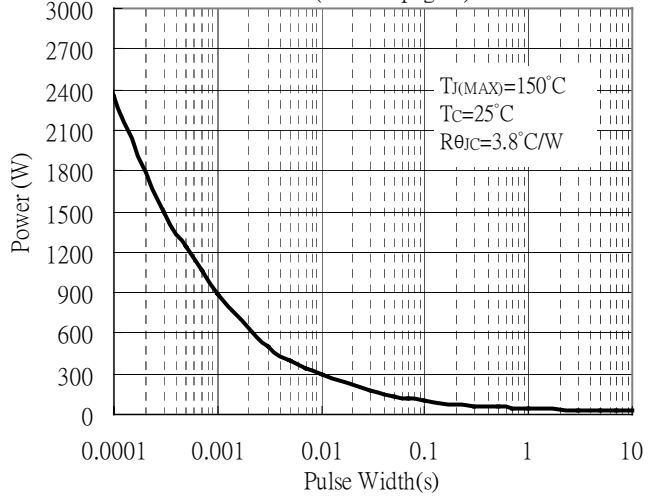


**Typical Characteristics(Cont.)**

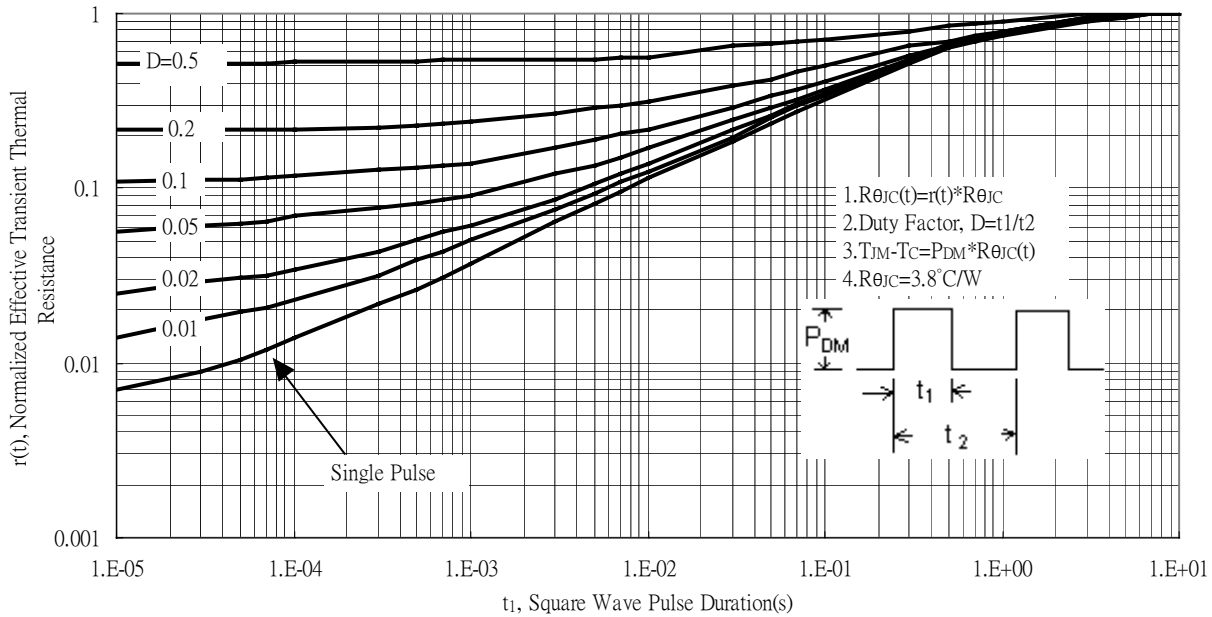
Typical Transfer Characteristics



Single Pulse Power Rating, Junction to Ambient  
 (Note on page 2)



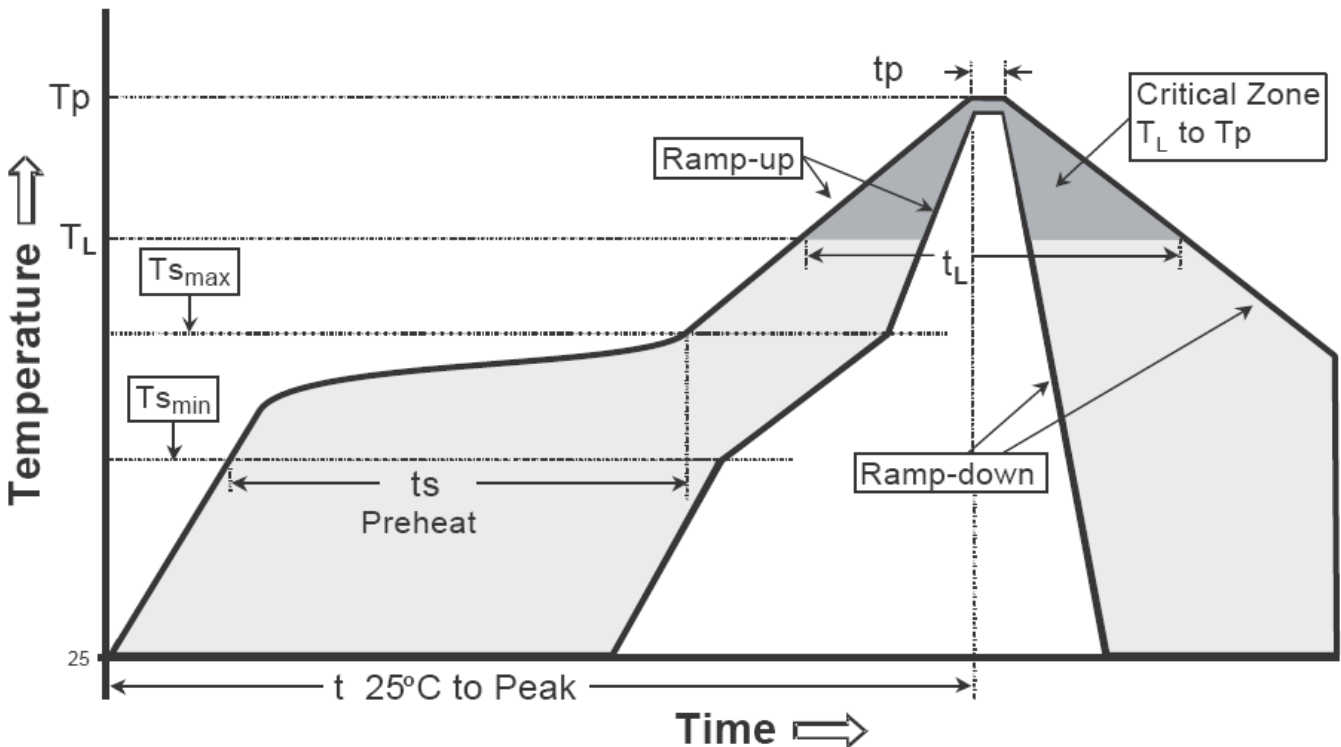
Transient Thermal Response Curves



**Recommended wave soldering condition**

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

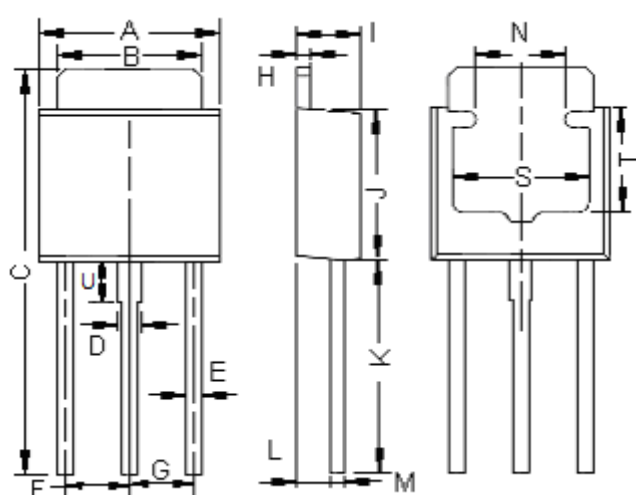
**Recommended temperature profile for IR reflow**



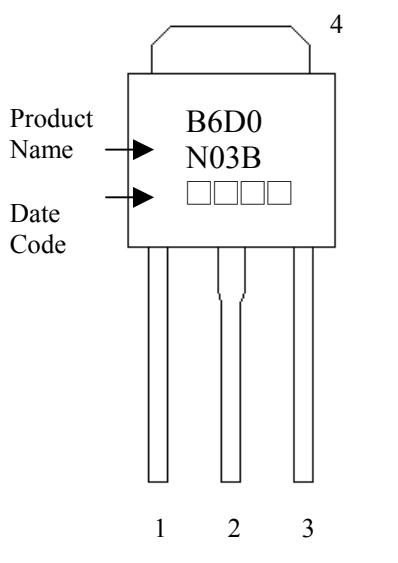
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (TL)	183°C	217°C
- Time (tL)	60-150 seconds	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-251 Dimension**



**Marking:**



Product Name → B6D0  
 N03B  
 Date Code → □□□□

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

3-Lead TO-251 Plastic Package  
 CYStek Package Code: I3

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.250	0.262	6.350	6.650	J	0.213	0.224	5.400	5.700
B	0.205	0.213	5.200	5.400	K	0.295	0.311	7.500	7.900
C	0.571	0.587	14.500	14.900	L	0.042	0.054	1.050	1.350
D	0.028	0.035	0.700	0.900	M	0.017	0.023	0.430	0.580
E	0.020	0.028	0.500	0.700	N	0.118	REF	3.000	REF
F	0.091	TYP	2.300	TYP	S	0.197	REF	5.000	REF
G	0.091	TYP	2.300	TYP	T	0.150	REF	3.800	REF
H	0.017	0.023	0.430	0.580	U	0.055	REF	1.400	REF
I	0.087	0.094	2.200	2.400					

**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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