

# N-Channel Enhancement Mode Power MOSFET

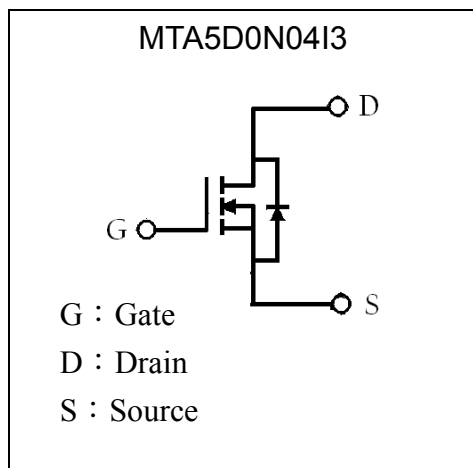
## MTA5D0N04I3

<b>BV<sub>DSS</sub></b>	<b>40V</b>
<b>I<sub>D</sub>@ V<sub>GS</sub>=10V, T<sub>C</sub>=25°C</b>	<b>51A</b>
<b>R<sub>DS(ON)</sub>@ V<sub>GS</sub>=4.5V, I<sub>D</sub>=20A</b>	<b>5.7mΩ (typ)</b>
<b>R<sub>DS(ON)</sub>@ V<sub>GS</sub>=2.5V, I<sub>D</sub>=15A</b>	<b>6.6mΩ (typ)</b>

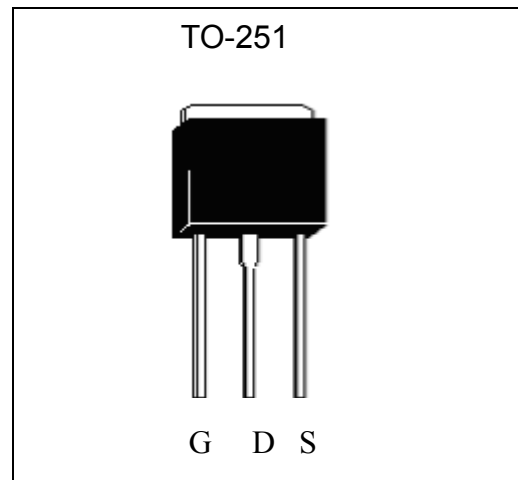
### Features

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

### Symbol

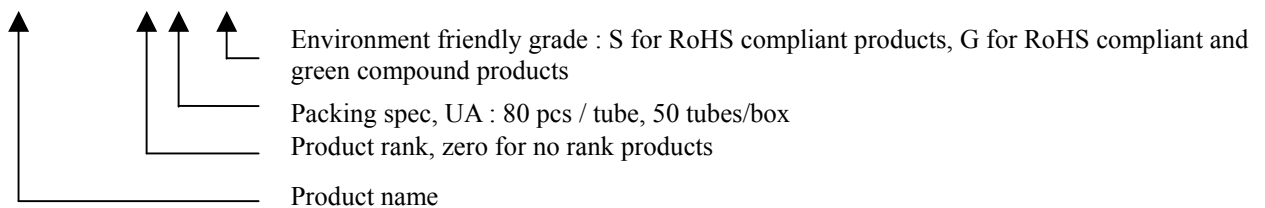


### Outline



### Ordering Information

Device	Package	Shipping
MTA5D0N04I3-0-UA-G	TO-251 (RoHS compliant and halogen-free package)	80 pcs/tube, 50 tubes/box





**Absolute Maximum Ratings** (T<sub>C</sub>=25°C, unless otherwise noted)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V <sub>DS</sub>	40	V
Gate-Source Voltage	V <sub>GS</sub>	±12	
Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>C</sub> =25°C	I <sub>D</sub>	51	A
Continuous Drain Current @ V <sub>GS</sub> =10V, T <sub>C</sub> =100°C		32	
Pulsed Drain Current (Note 1)	I <sub>DM</sub>	204	
Avalanche Current @ L=0.1mH	I <sub>AS</sub>	46	mJ
Avalanche Energy @ L=1mH, I <sub>D</sub> =20A, V <sub>DD</sub> =15V (Note 3)	E <sub>AS</sub>	200	
Repetitive Avalanche Energy @ L=0.05mH (Note 2)	E <sub>AR</sub>	6	
Total Power Dissipation @ T <sub>C</sub> =25°C	P <sub>D</sub>	42	W
Total Power Dissipation @ T <sub>C</sub> =100°C		17	
Operating Junction and Storage Temperature Range	T <sub>j</sub> , T <sub>stg</sub>	-55~+150	°C

- Note : 1. Pulse width limited by maximum junction temperature.  
 2. Duty cycle ≤ 1%.  
 3. 100% tested by conditions of L=0.1mH, V<sub>GS</sub>=10V, I<sub>AS</sub>=12A, V<sub>DD</sub>=15V

**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R <sub>th,j-c</sub>	3	°C/W
Thermal Resistance, Junction-to-ambient, max	R <sub>th,j-a</sub>	110	

**Characteristics (T<sub>C</sub>=25°C, unless otherwise specified)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	40	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	0.3	-	1.2		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V
I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =32V, V <sub>GS</sub> =0V
	-	-	25		V <sub>DS</sub> =32V, V <sub>GS</sub> =0V, T <sub>j</sub> =125°C
*R <sub>DS(ON)</sub>	-	5.7	8	mΩ	V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A
	-	6.6	10		V <sub>GS</sub> =2.5V, I <sub>D</sub> =15A
*G <sub>FS</sub>	-	25	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =10A
<b>Dynamic</b>					
*Q <sub>g</sub>	-	80.9	-	nC	V <sub>DS</sub> =20V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V
*Q <sub>gs</sub>	-	5.3	-		
*Q <sub>gd</sub>	-	11.7	-		
*t <sub>d(ON)</sub>	-	11.8	-	ns	V <sub>DS</sub> =20V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V, R <sub>GS</sub> =1Ω
*t <sub>r</sub>	-	17.2	-		
*t <sub>d(OFF)</sub>	-	87.4	-		
*t <sub>f</sub>	-	6.2	-		



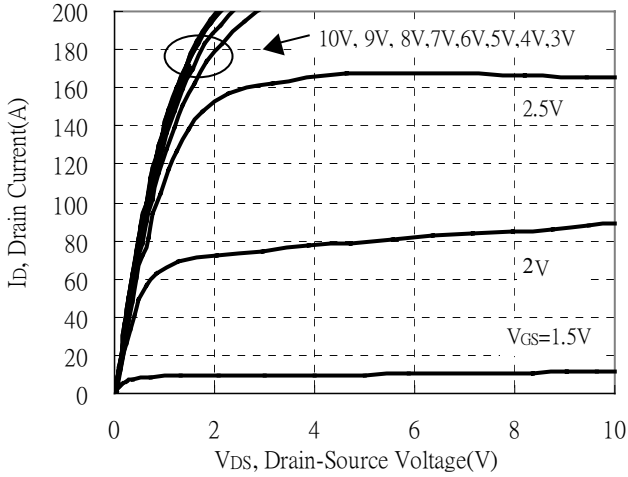
Ciss	-	2627	-	pF	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f=1MHz
Coss	-	174	-		
Crss	-	127	-		
Rg	-	1.6	-	Ω	f=1MHz
<b>Source-Drain Diode</b>					
*I <sub>S</sub>	-	-	51	A	
*I <sub>SM</sub>	-	-	204		
*V <sub>SD</sub>	-	0.78	1.2	V	I <sub>S</sub> =6A, V <sub>GS</sub> =0V
*trr	-	14.5	-	ns	I <sub>F</sub> =6A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/μs
*Qrr	-	9.5	-	nC	

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

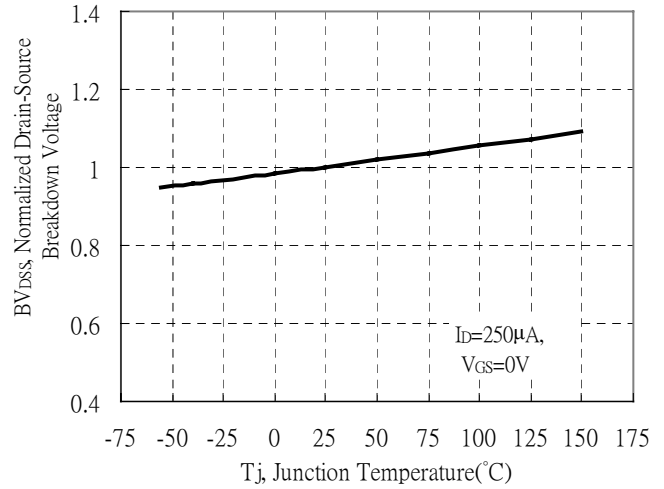


**Typical Characteristics**

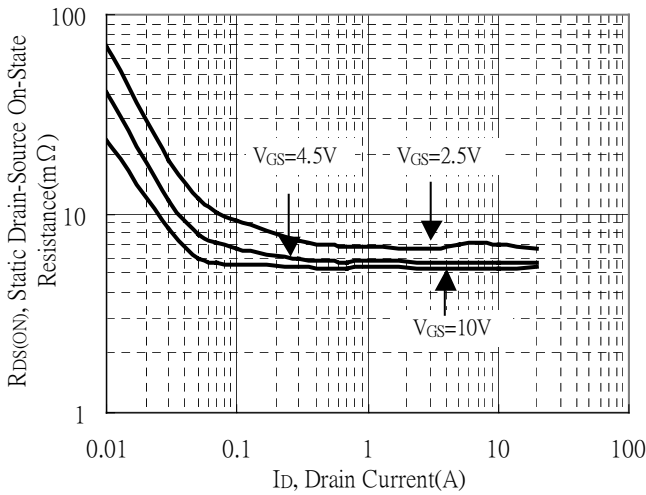
Typical Output Characteristics



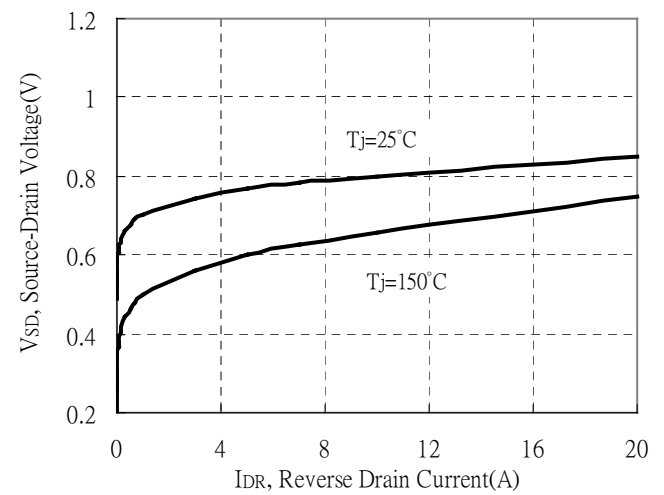
Brekdown Voltage vs Ambient Temperature



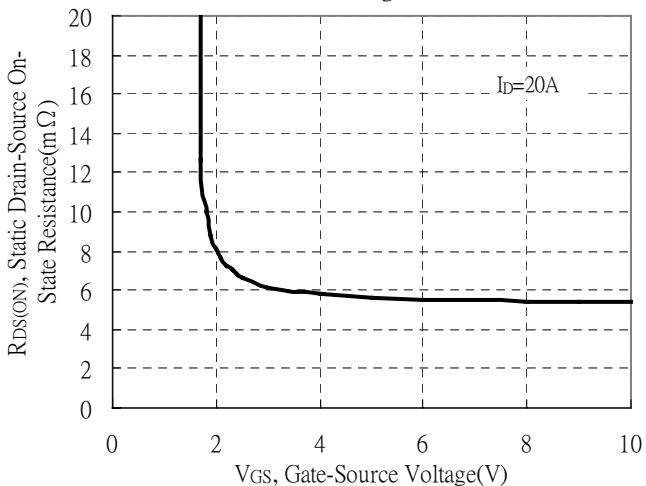
Static Drain-Source On-State resistance vs Drain Current



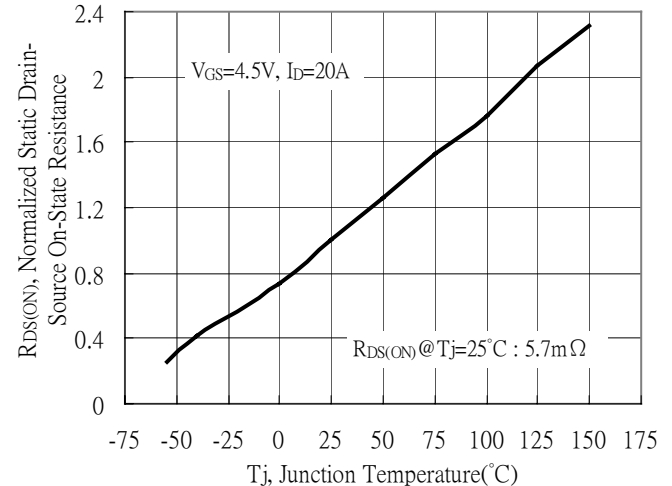
Reverse Drain Current vs Source-Drain Voltage



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

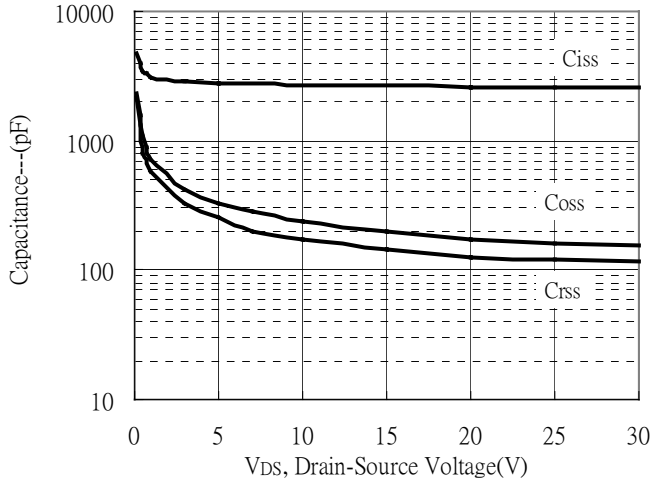


Drain-Source On-State Resistance vs Junction Temperature

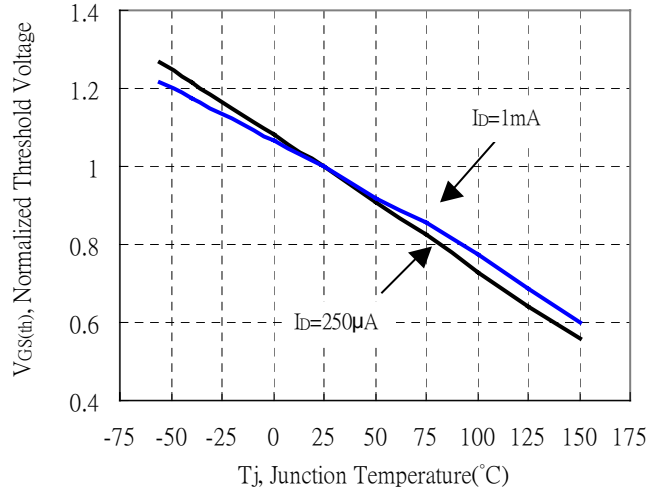


## Typical Characteristics(Cont.)

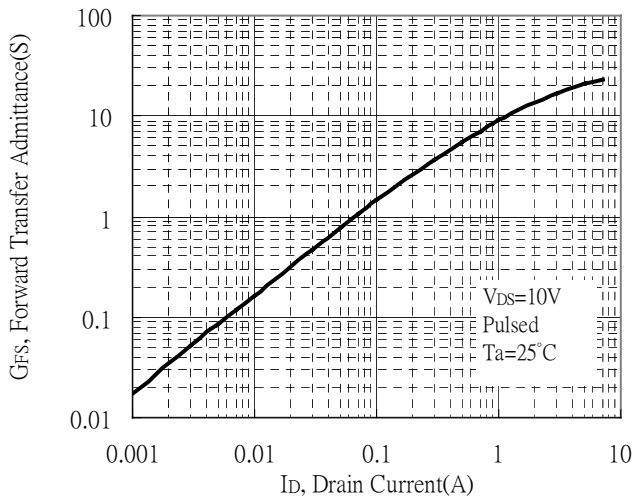
Capacitance vs Drain-to-Source Voltage



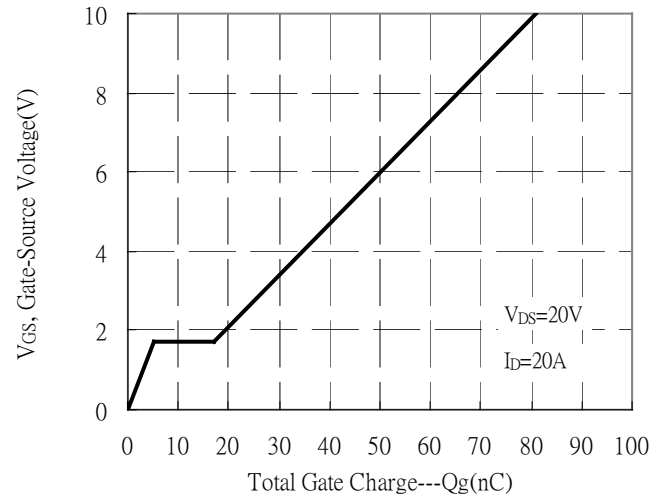
Normalized Threshold Voltage vs Junction Temperature



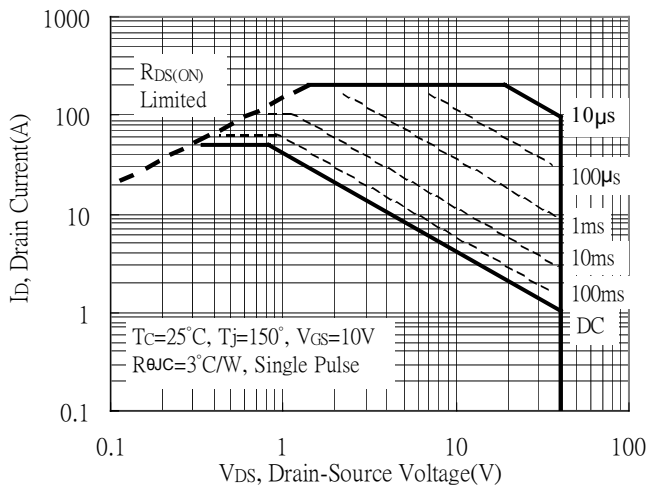
Forward Transfer Admittance vs Drain Current



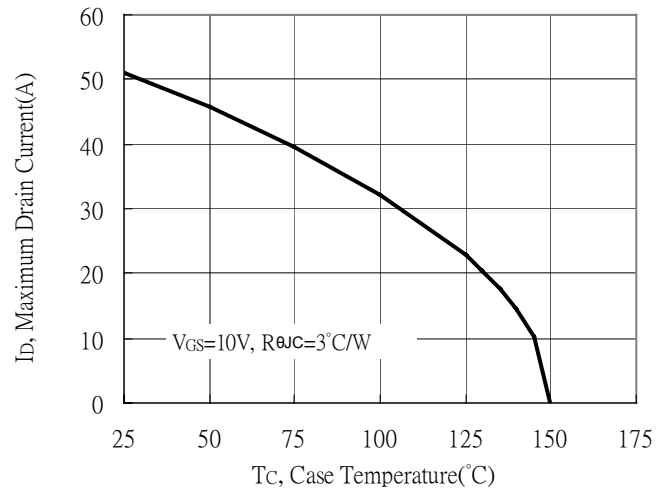
Gate Charge Characteristics



Maximum Safe Operating Area



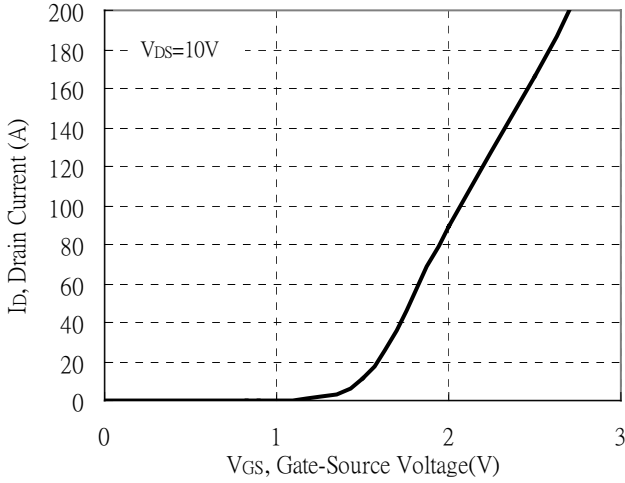
Maximum Drain Current vs Case Temperature



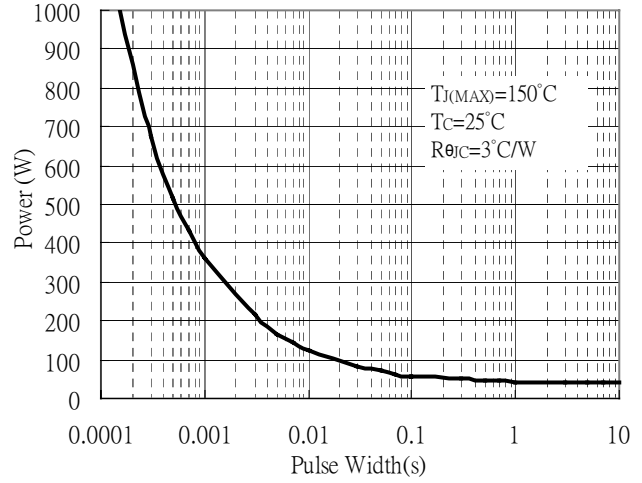


**Typical Characteristics(Cont.)**

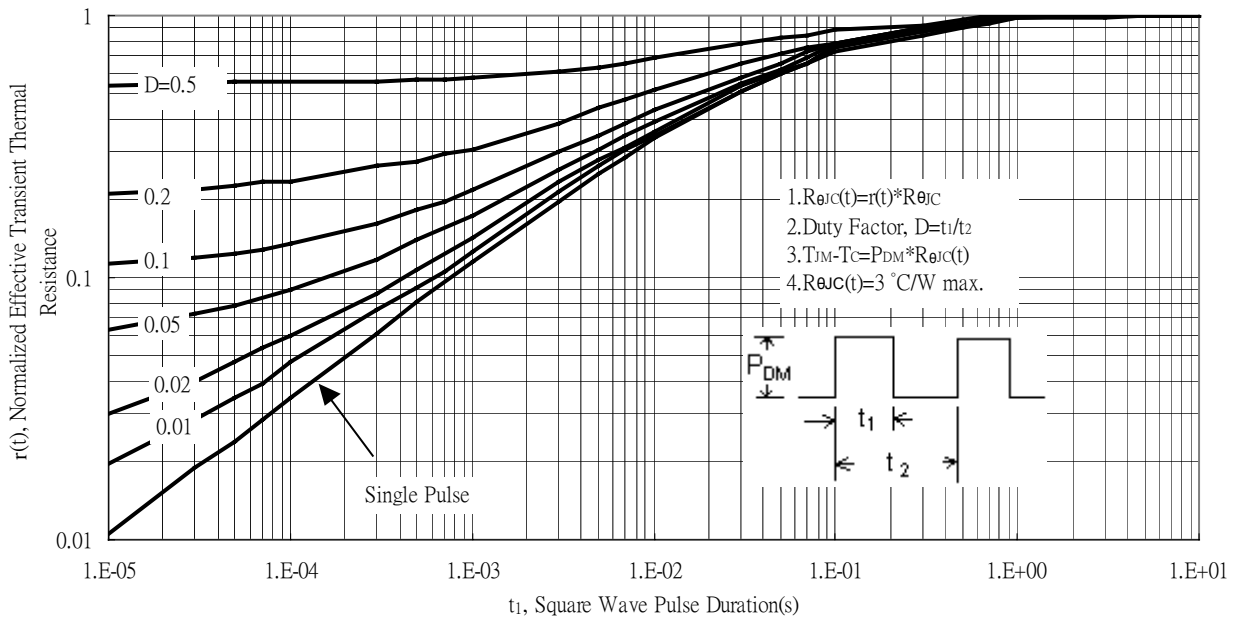
Typical Transfer Characteristics



Single Pulse Power Rating, Junction to Case



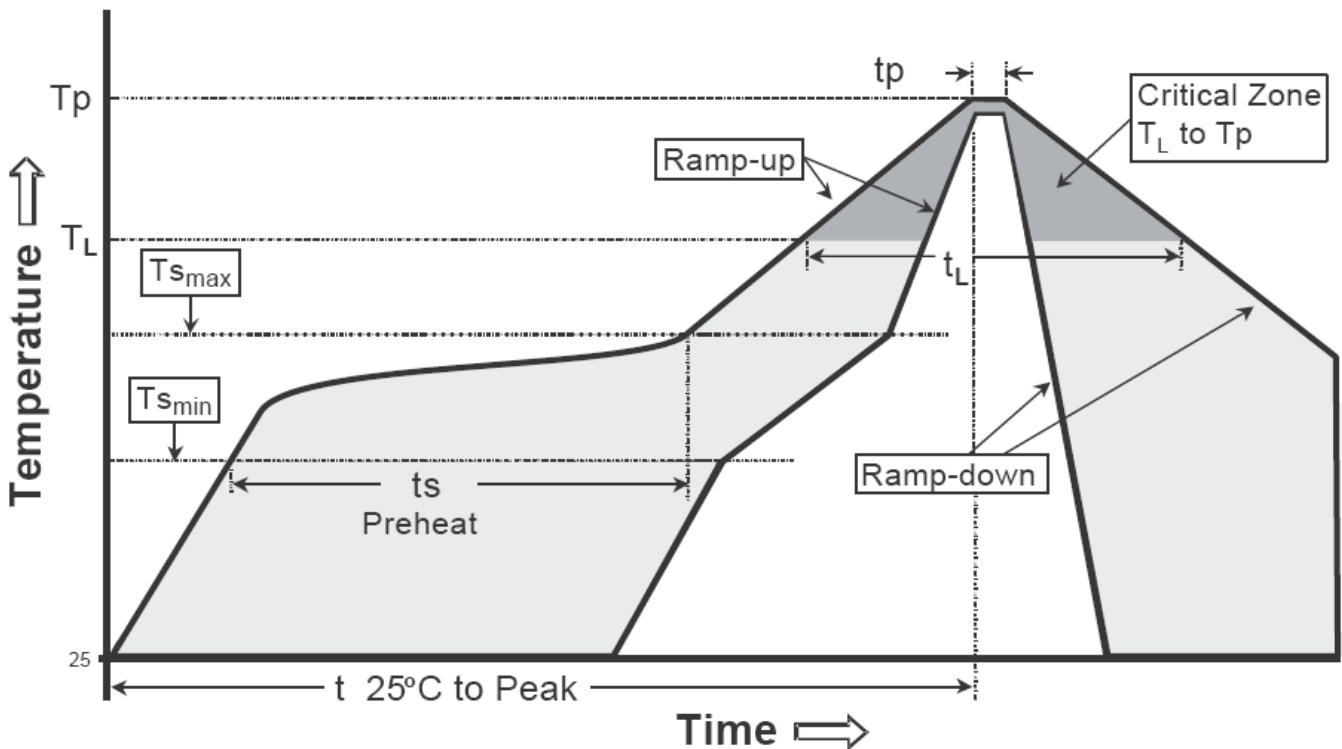
Transient Thermal Response Curves



**Recommended wave soldering condition**

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

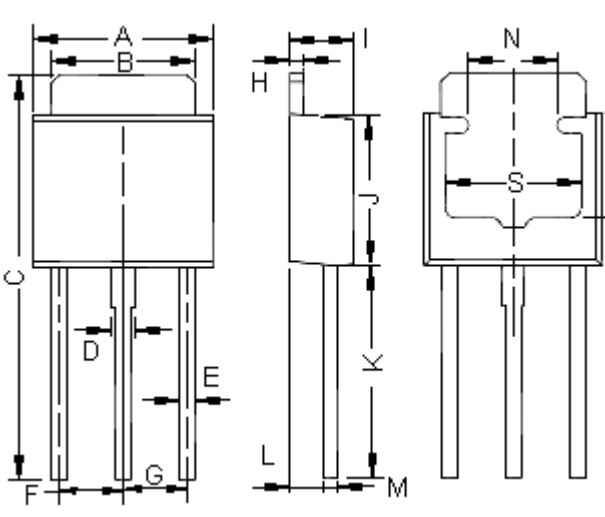
**Recommended temperature profile for IR reflow**



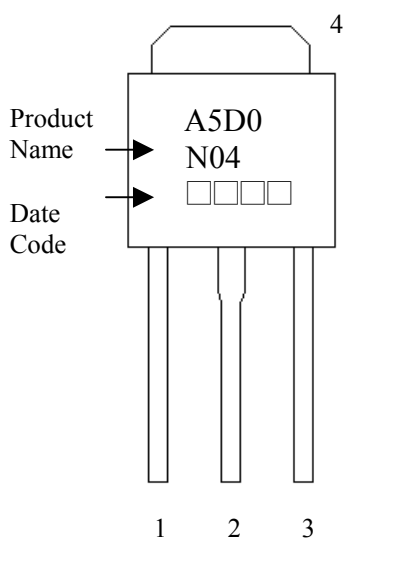
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (TL)	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 → A5D0  
 N04  
 Date Code → □□□□

1    2    3    4

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	0.2500	0.2618	6.35	6.65	I	0.0866	0.0945	2.20	2.40
B	0.2047	0.2126	5.20	5.40	J	0.2126	0.2244	5.40	5.70
C	0.5709	0.5866	14.50	14.90	K	0.2992	0.3071	7.60	7.80
D	0.0276	0.0354	0.70	0.90	L	0.0453	0.0492	1.15	1.25
E	0.0199	0.0276	0.50	0.70	M	0.0169	0.0228	0.43	0.58
F	0.0886	0.0925	2.25	2.35	N	0.1181	REF	3.00	REF
G	0.0886	0.0925	2.25	2.35	S	0.1969	REF	5.00	REF
H	0.0169	0.0228	0.43	0.58	T	0.1496	REF	3.80	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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