

**N -Channel Logic Level Enhancement Mode Power MOSFET**

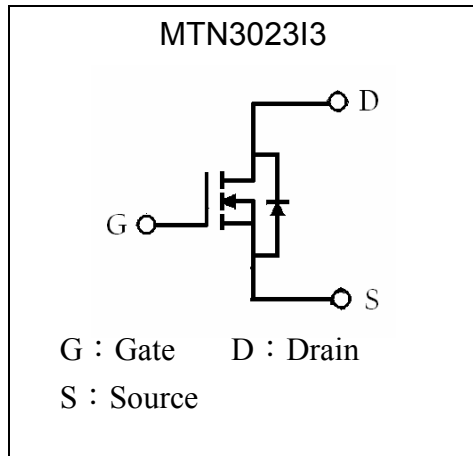
# MTN3023I3

BV <sub>DSS</sub>		30V
I <sub>D</sub>		30A
R <sub>DSON(TYP)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	14mΩ
	V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	21mΩ

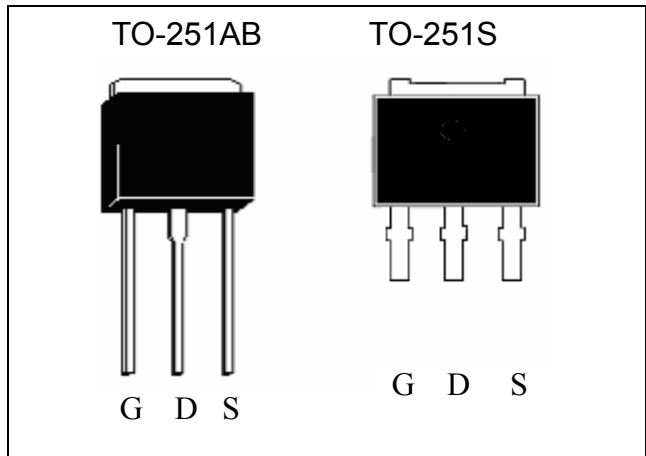
**Features**

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

**Equivalent Circuit**



**Outline**



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

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V <sub>DS</sub>	30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	
Continuous Drain Current @ T <sub>C</sub> =25°C	I <sub>D</sub>	30	A
Continuous Drain Current @ T <sub>C</sub> =100°C	I <sub>D</sub>	18	
Pulsed Drain Current *1	I <sub>DM</sub>	100	
Total Power Dissipation @T <sub>C</sub> =25°C	P <sub>D</sub>	50	W
Total Power Dissipation @T <sub>A</sub> =25°C		1.14	
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%



**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R <sub>th,j-c</sub>	2.5	°C/W
Thermal Resistance, Junction-to-ambient, max	R <sub>th,j-a</sub>	110	°C/W

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

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
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	-	0.02	-	V/°C	Reference to 25°C, I <sub>D</sub> =1mA
V <sub>GS(th)</sub>	1	1.5	2	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
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> =30V, V <sub>GS</sub> =0V, T <sub>j</sub> =25°C
	-	-	25	μA	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>j</sub> =70°C
*R <sub>DS(ON)</sub>	-	14	20	mΩ	I <sub>D</sub> =20A, V <sub>GS</sub> =10V
	-	21	28		I <sub>D</sub> =10A, V <sub>GS</sub> =4.5V
*G <sub>FS</sub>	-	13	-	S	V <sub>DS</sub> =5V, I <sub>D</sub> =15A
<b>Dynamic</b>					
C <sub>iss</sub>	-	750	-	pF	V <sub>DS</sub> =25V, V <sub>GS</sub> =0, f=1MHz
C <sub>oss</sub>	-	61	-		
C <sub>rss</sub>	-	52	-		
t <sub>d(ON)</sub>	-	10	-	ns	V <sub>DS</sub> =15V, I <sub>D</sub> =1A, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω, R <sub>D</sub> =15Ω
t <sub>r</sub>	-	17	-	ns	
t <sub>d(OFF)</sub>	-	36	-	ns	
t <sub>f</sub>	-	18	-	ns	
Q <sub>g</sub>	-	22	-	nC	V <sub>DS</sub> =15V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V,
Q <sub>gs</sub>	-	4.2	-	nC	
Q <sub>gd</sub>	-	3.1	-	nC	

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

**Source Drain Diode**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
*V <sub>SD</sub>	-	-	1.3	V	I <sub>S</sub> =15A, V <sub>GS</sub> =0V
*T <sub>rr</sub>	-	10	-	ns	I <sub>S</sub> =20A, V <sub>GS</sub> =0V, dI/dt=100A/μs
Q <sub>rr</sub>	-	21	-	nC	

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

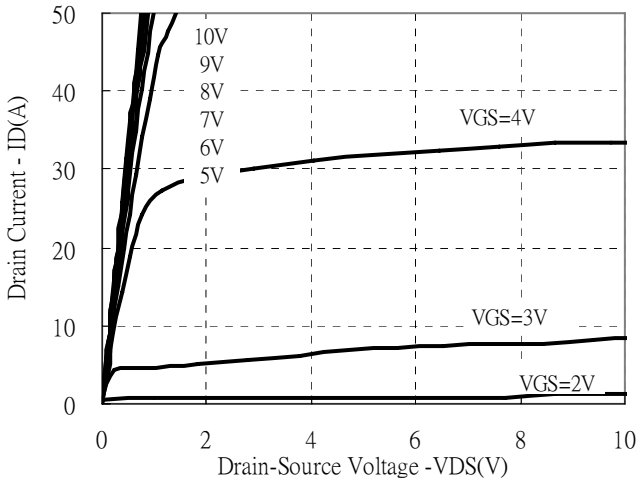
**Ordering Information**

Device	Package	Shipping
MTN3023I3B-0-UB-G	TO-251AB (RoHS compliant and halogen-free package)	80 pcs / tube, 50 tubes / box
MTN3023I3S-0-UB-G	TO-251S (RoHS compliant and halogen-free package)	80 pcs / tube, 50 tubes / box

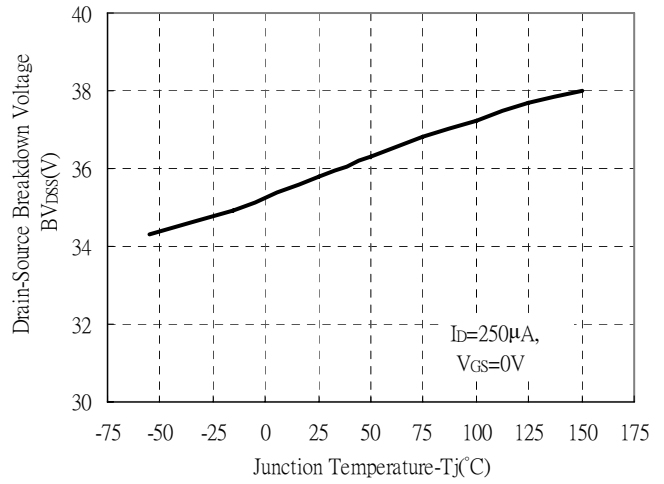


**Typical Characteristics**

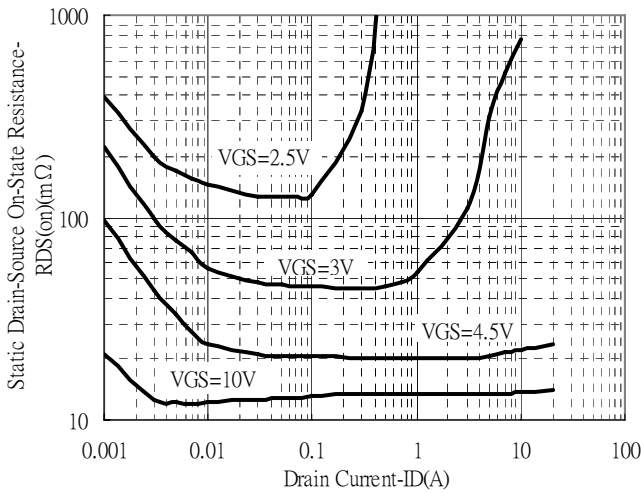
Typical Output Characteristics



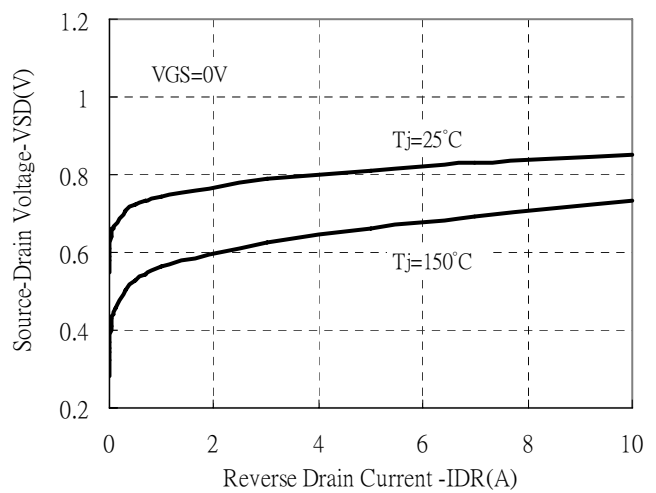
Brekdown Voltage vs Ambient Temperature



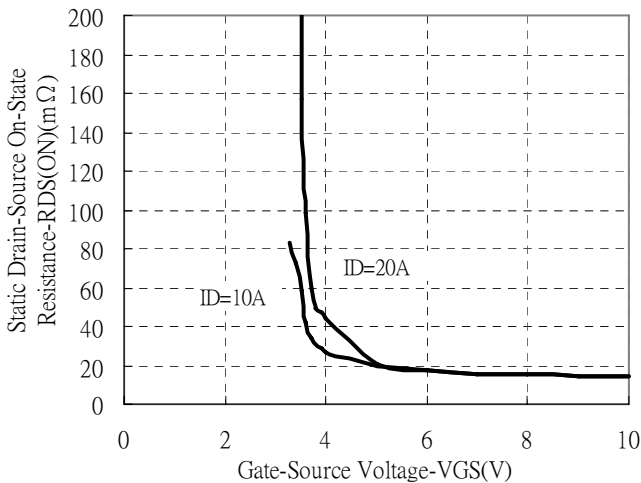
Static Drain-Source On-State resistance vs Drain Current



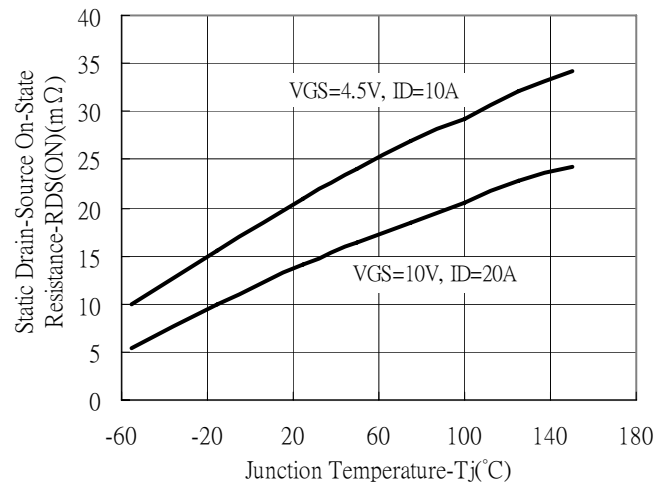
Reverse Drain Current vs Source-Drain Voltage



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

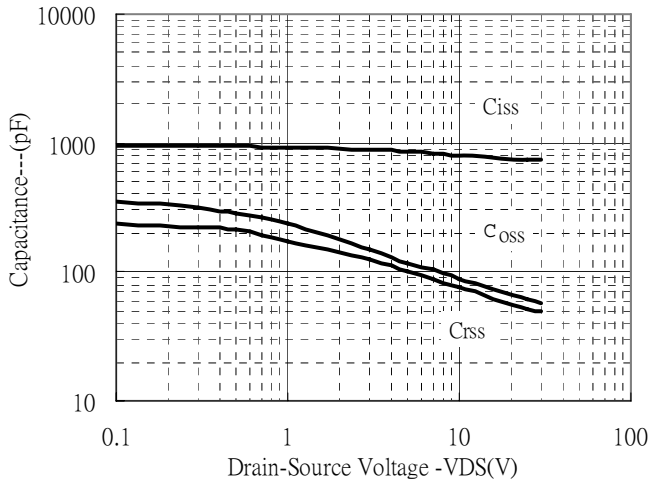


Drain-Source On-State Resistance vs Junction Temperature

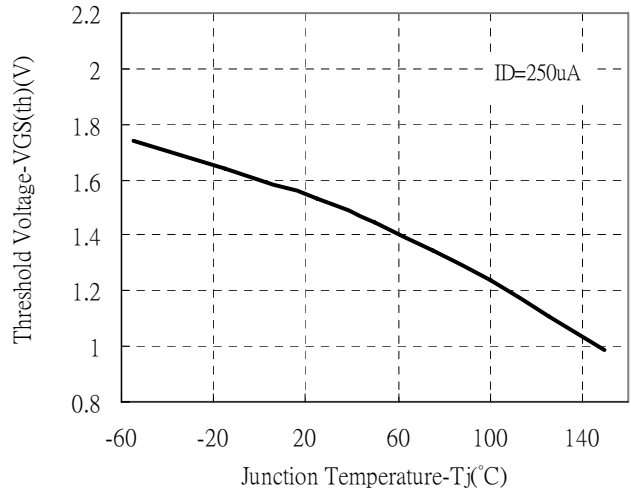


**Typical Characteristics(Cont.)**

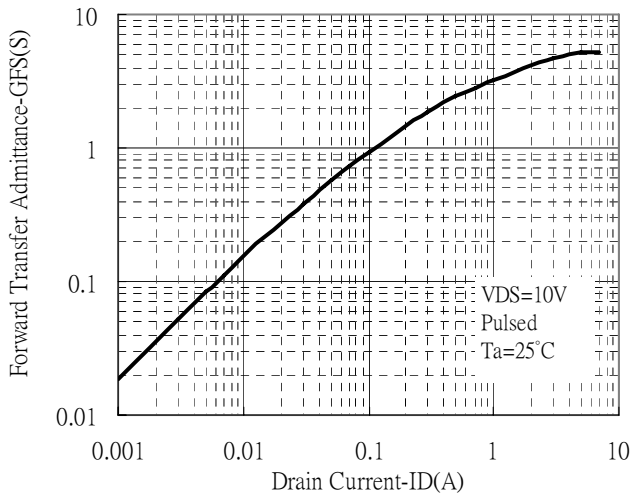
Capacitance vs Drain-to-Source Voltage



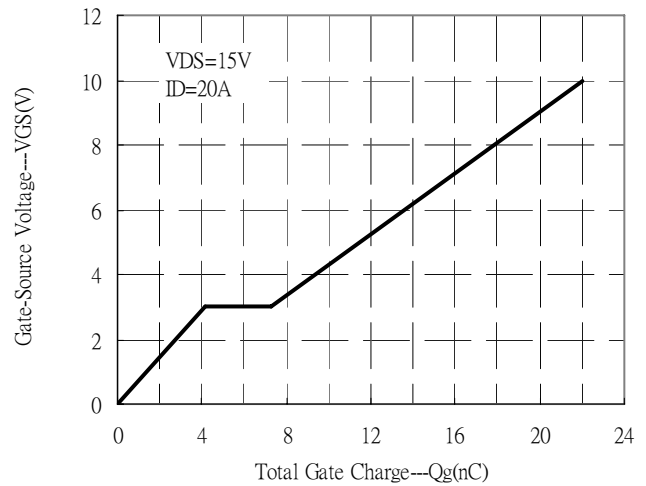
Threshold Voltage vs Junction Temperature



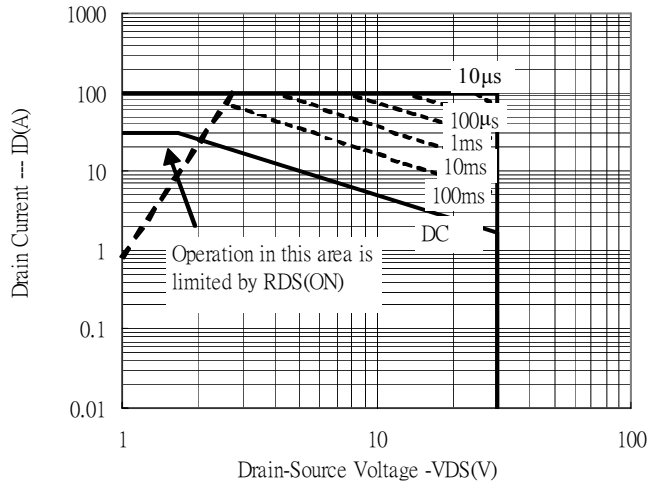
Forward Transfer Admittance vs Drain Current



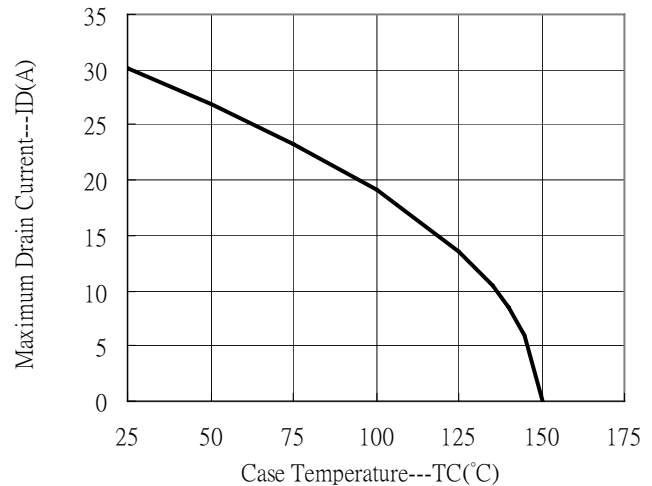
Gate Charge Characteristics



Maximum Safe Operating Area



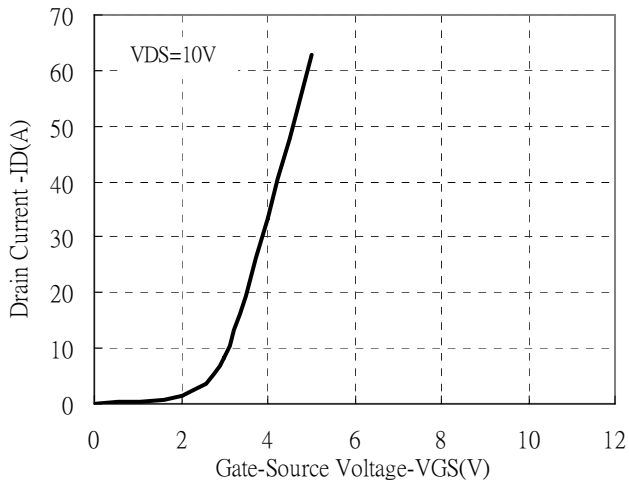
Maximum Drain Current vs Case Temperature



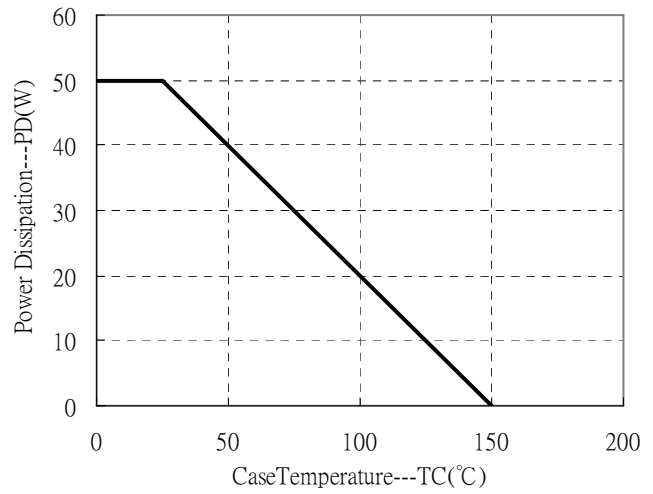


### Typical Characteristics(Cont.)

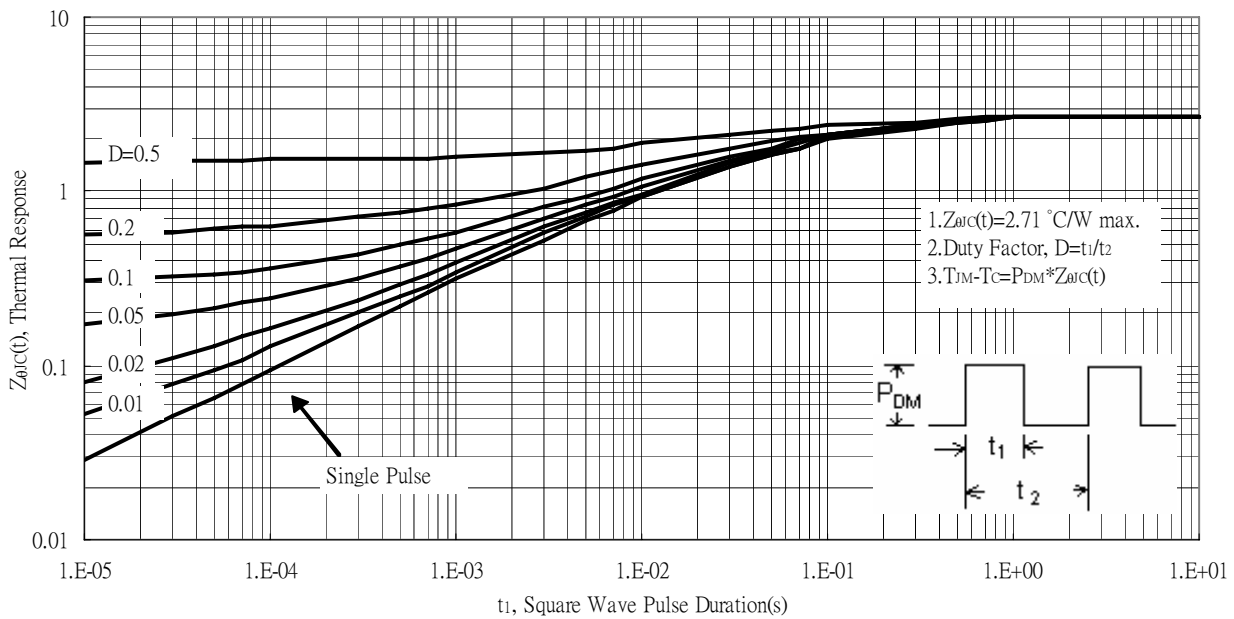
Typical Transfer Characteristics



Power Derating Curve



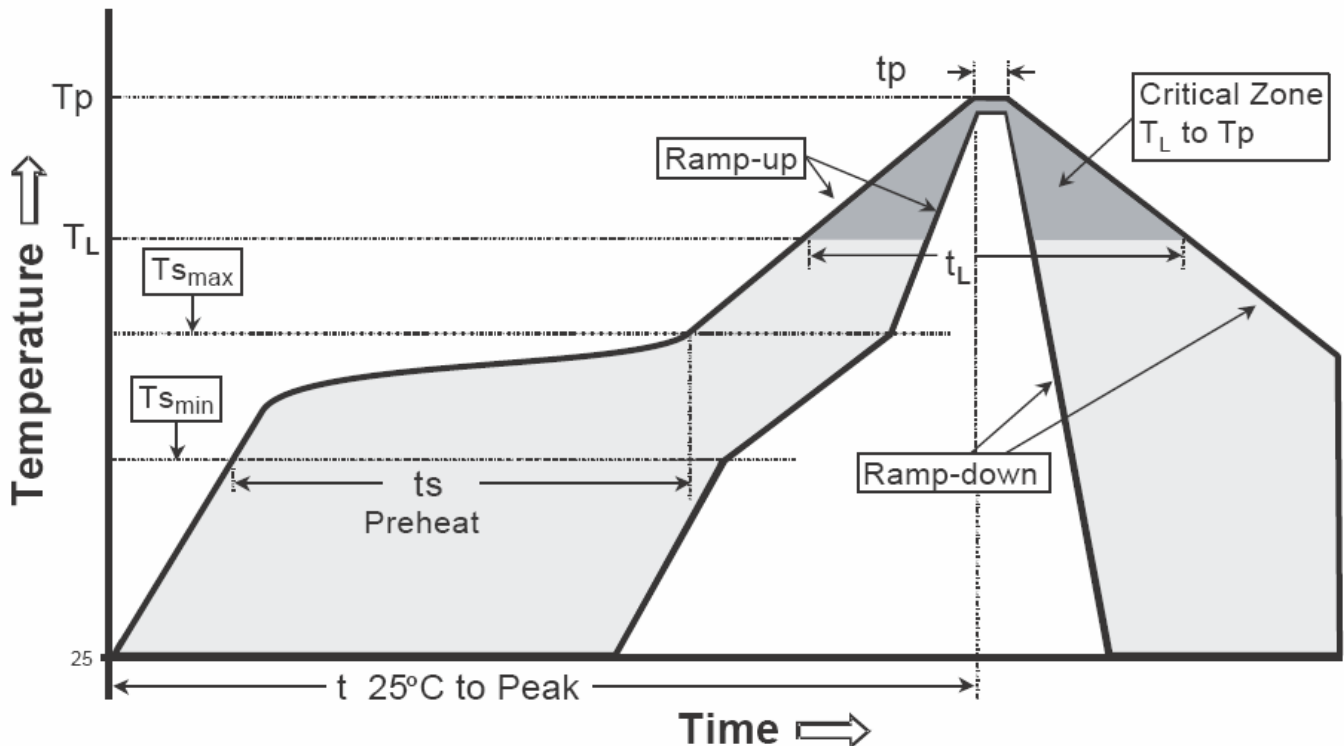
Transient Thermal Response Curves



**Recommended wave soldering condition**

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

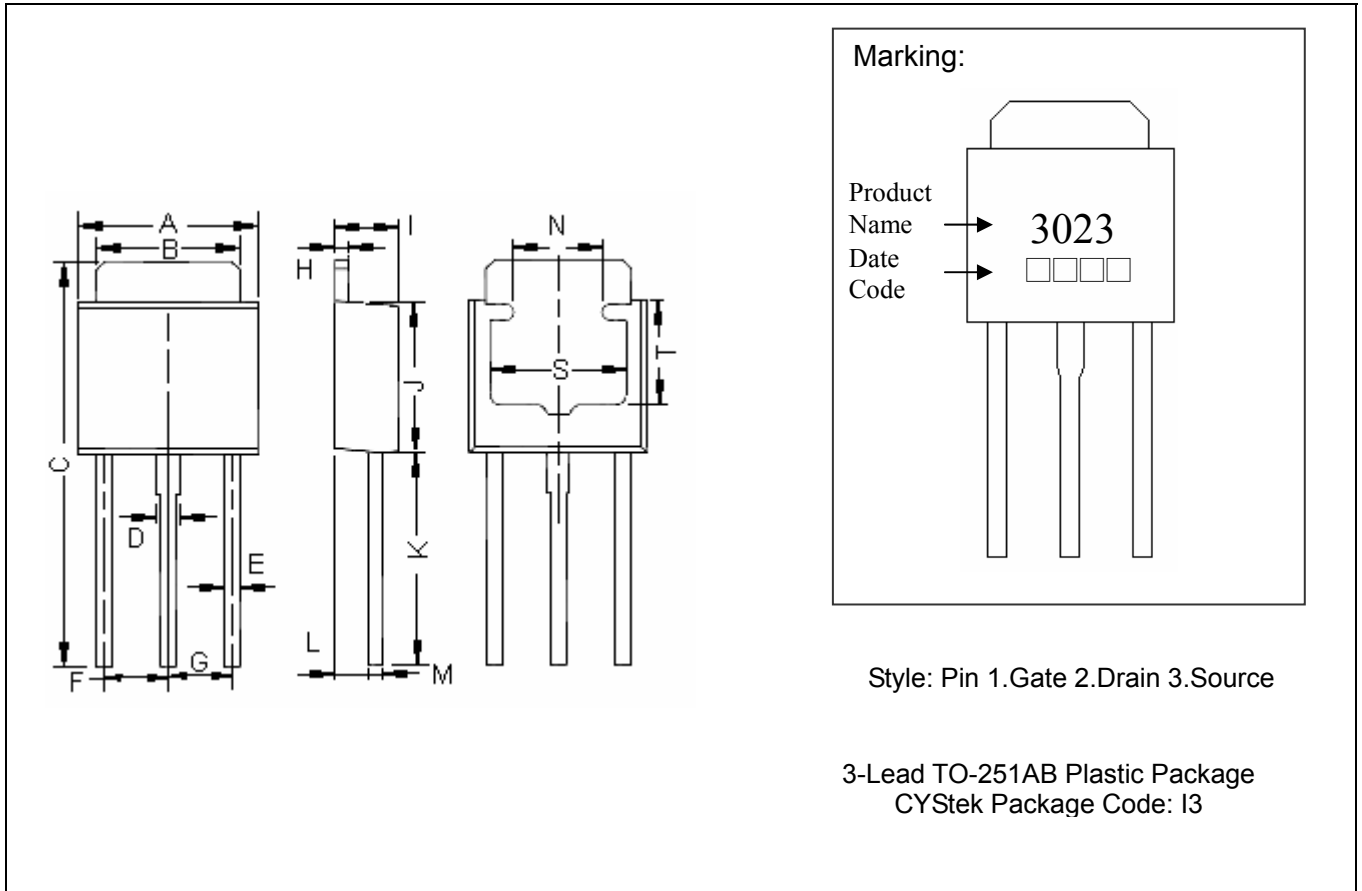
**Recommended temperature profile for IR reflow**



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 (T <sub>L</sub> )	183°C	217°C
- Time (t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak Temperature(T <sub>P</sub> )	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-251AB Dimension**



**Marking:**

Product Name → 3023  
 Date Code → □□□□

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

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

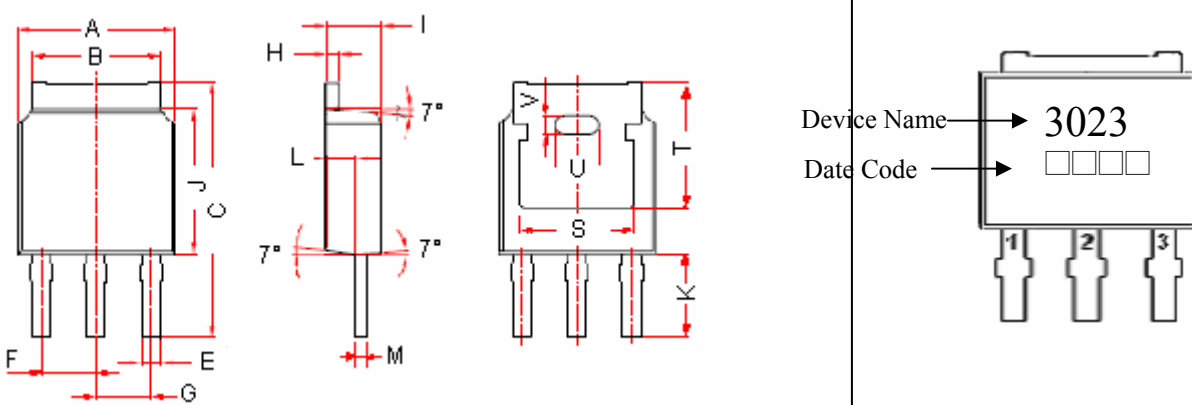
DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.2500	0.2618	6.35	6.65	I	0.0866	0.0945	2.20	2.40
B	0.2047	0.2126	5.20	5.40	J	0.2126	0.2244	5.40	5.70
C	0.5709	0.5866	14.50	14.90	K	0.2992	0.3071	7.60	7.80
D	0.0276	0.0354	0.70	0.90	L	0.0453	0.0492	1.15	1.25
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.

**TO-251S Dimension**



Marking :

Device Name → 3023  
 Date Code → □□□□

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

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

\*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.2559	0.2638	6.50	6.70	J	0.2362	0.2441	6.00	6.20
B	0.2020	0.2126	5.13	5.46	K	0.1299	0.1457	3.30	3.70
C	0.4094	0.4331	10.40	11.00	L	0.0358	0.0437	0.91	1.11
E	0.0280	0.0319	0.71	0.81	M	0.0181	0.0220	0.46	0.56
F	0.0858	0.0941	2.18	2.39	S	0.1902	REF	4.83	REF
G	0.0858	0.0941	2.18	2.39	T	0.2106	REF	5.35	REF
H	0.0181	0.0220	0.46	0.56	U	0.0701	REF	1.78	REF
I	0.0902	0.0937	2.29	2.38	V	0.0299	REF	0.76	REF

Notes: 1.Controlling dimension: inch.  
 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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