

**N-Channel Enhancement Mode Power MOSFET**

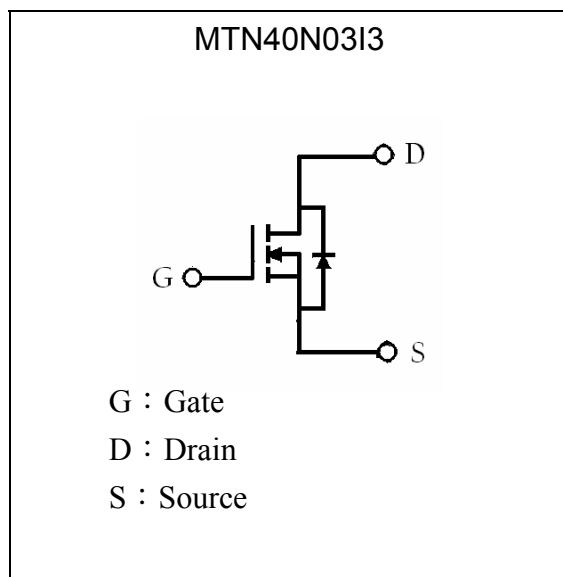
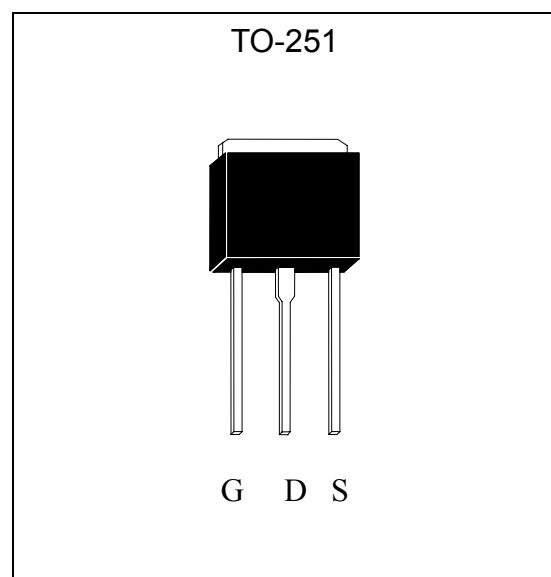
# MTN40N03I3

 **$BV_{DSS} : 30V$**  **$R_{DS(ON)} : 21m\Omega$**  **$I_D : 36A$** **Description**

The MTN40N03I3 is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-251 package is universally preferred for all commercial-industrial applications

**Features**

- Simple Drive Requirement
- Dynamic  $dv/dt$  Rating
- Fast Switching Characteristic
- RoHS compliant package

**Symbol****Outline**



**Absolute Maximum Ratings** (Tc=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V <sub>DS</sub>	30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current @ Tc=25°C, VGS=10V	I <sub>D</sub>	36	A
Continuous Drain Current @Tc=100°C, VGS=10V	I <sub>D</sub>	25	A
Pulsed Drain Current (Note 1)	I <sub>DM</sub>	150	A
Total Power Dissipation (Tc=25°C)	P <sub>D</sub>	50	W
Linear Derating Factor		0.4	W/°C
Operating Junction and Storage Temperature	T <sub>j</sub> , T <sub>stg</sub>	-55~+150	°C

Note : 1.Repetitive rating; pulse width limited by maximum junction temperature.

**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



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

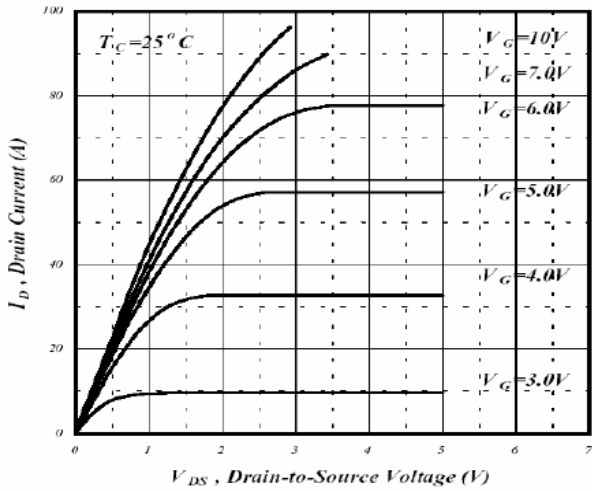
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	30	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250μA, T <sub>j</sub> =25°C
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	-	0.037	-	V/°C	Reference to 25°C, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	1	-	3	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA
*G <sub>FS</sub>	-	26	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =18A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±20
I <sub>DSS</sub>	-	-	25	μA	V <sub>DS</sub> =30V, V <sub>GS</sub> =0
	-	-	250	μA	V <sub>DS</sub> =24V, V <sub>GS</sub> =0, T <sub>C</sub> =125°C
*R <sub>DS(ON)</sub>	-	18	21	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =18A
	-	24	30		V <sub>GS</sub> =4.5V, I <sub>D</sub> =14A
<b>Dynamic</b>					
*Q <sub>g</sub>	-	17	-	nC	I <sub>D</sub> =18A, V <sub>DS</sub> =24V, V <sub>GS</sub> =5V
*Q <sub>gs</sub>	-	3	-		
*Q <sub>gd</sub>	-	10	-		
*t <sub>d(ON)</sub>	-	7.2	-	ns	V <sub>DS</sub> =15V, I <sub>D</sub> =18A, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω, R <sub>D</sub> =0.83Ω
*t <sub>r</sub>	-	60	-		
*t <sub>d(OFF)</sub>	-	22.5	-		
*t <sub>f</sub>	-	10	-		
C <sub>iss</sub>	-	800	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz
C <sub>oss</sub>	-	380	-		
C <sub>rss</sub>	-	133	-		
<b>Source-Drain Diode</b>					
*V <sub>SD</sub>	-	-	1.3	V	I <sub>S</sub> =36A, V <sub>GS</sub> =0V
*I <sub>S</sub>	-	-	36	A	V <sub>D</sub> =V <sub>G</sub> =0V, V <sub>S</sub> =1.3V
*I <sub>SM</sub>	-	-	150		

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

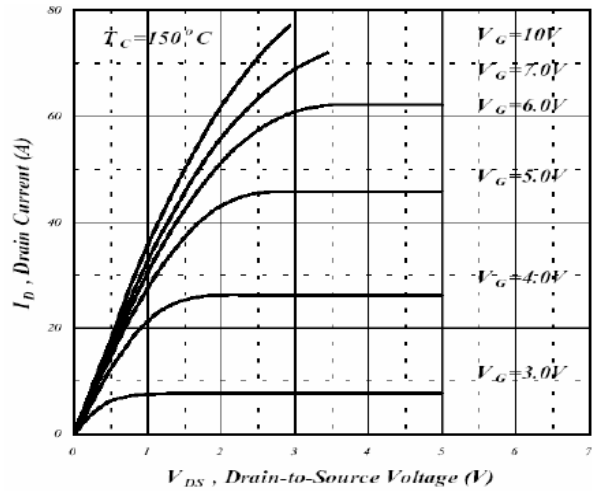
**Ordering Information**

Device	Package	Shipping	Marking
MTN40N03I3	TO-251 (RoHS compliant)	80 pcs / tube, 50 tubes / box	40N03

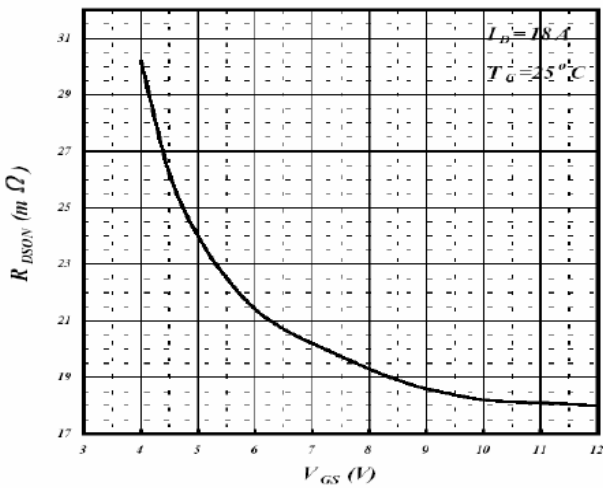
**Characteristic Curves**



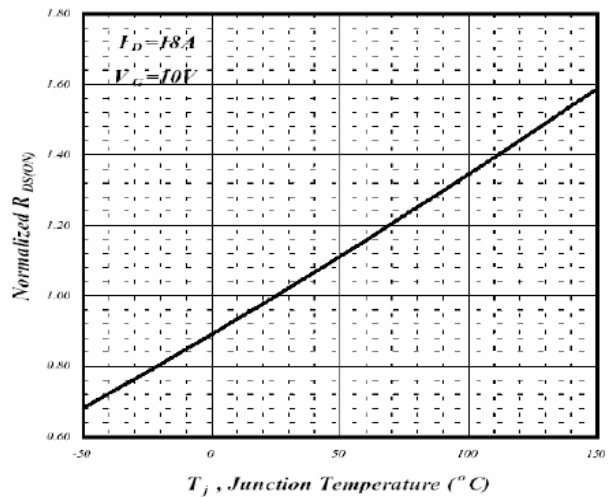
**Fig 1. Typical Output Characteristics**



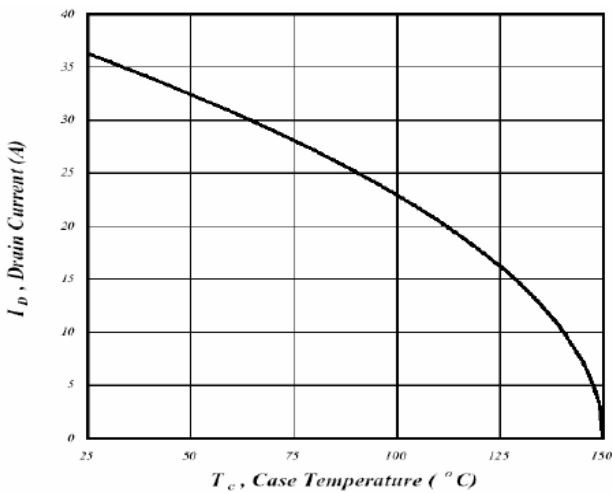
**Fig 2. Typical Output Characteristics**



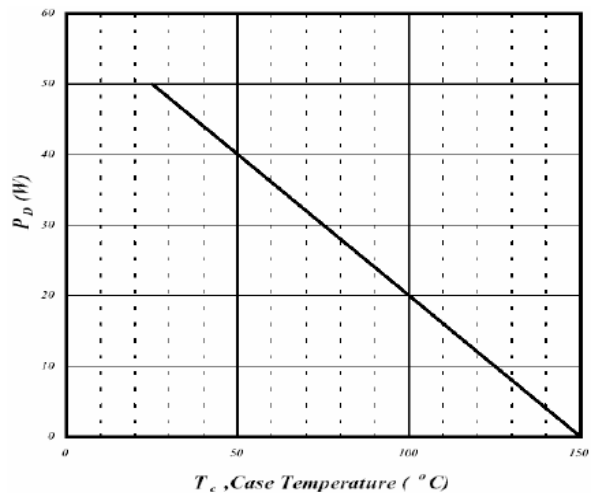
**Fig 3. On-Resistance v.s. Gate Voltage**



**Fig 4. Normalized On-Resistance v.s. Junction Temperature**

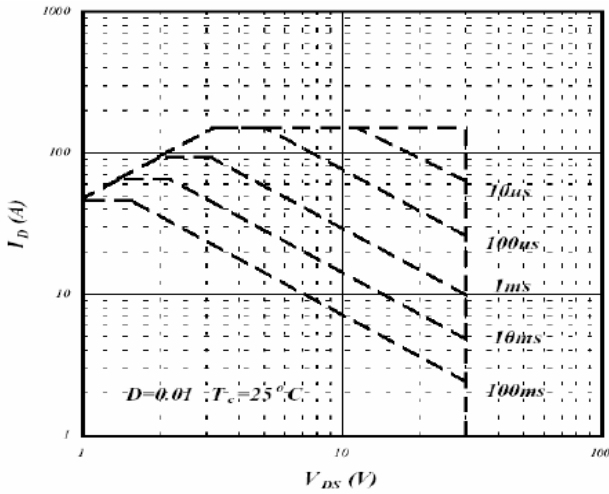


**Fig 5. Maximum Drain Current v.s. Case Temperature**

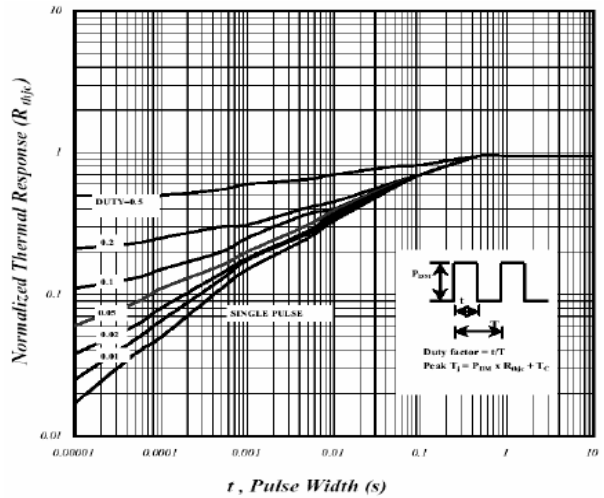


**Fig 6. Type Power Dissipation**

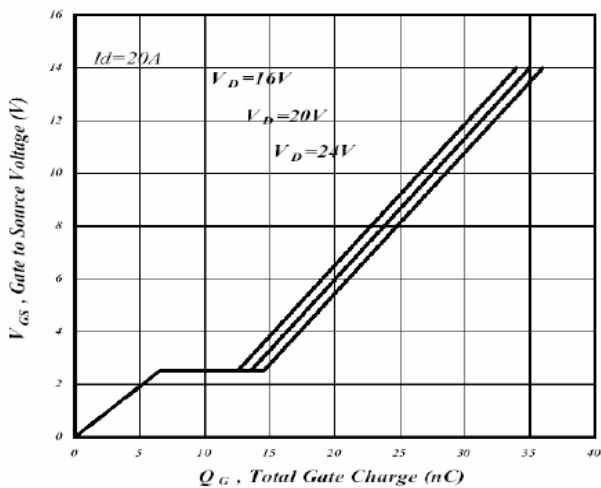
**Characteristic Curves(Cont.)**



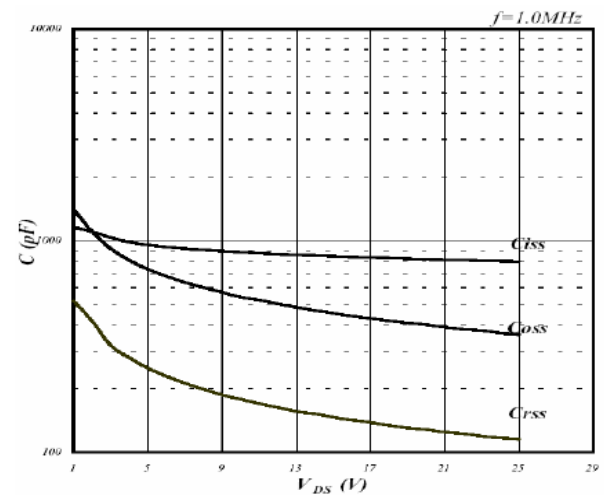
**Fig 7. Maximum Safe Operating Area**



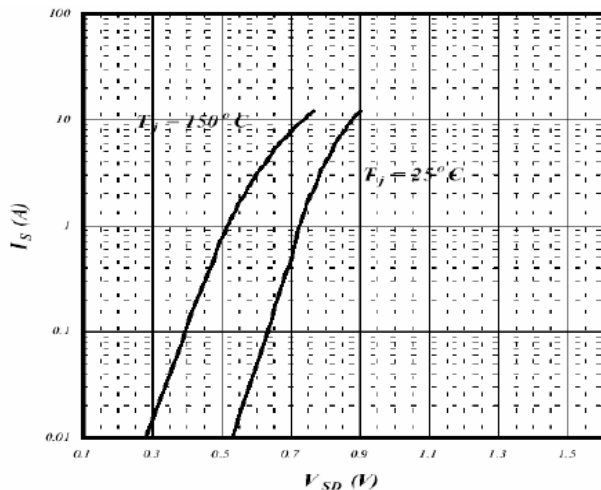
**Fig 8. Effective Transient Thermal Impedance**



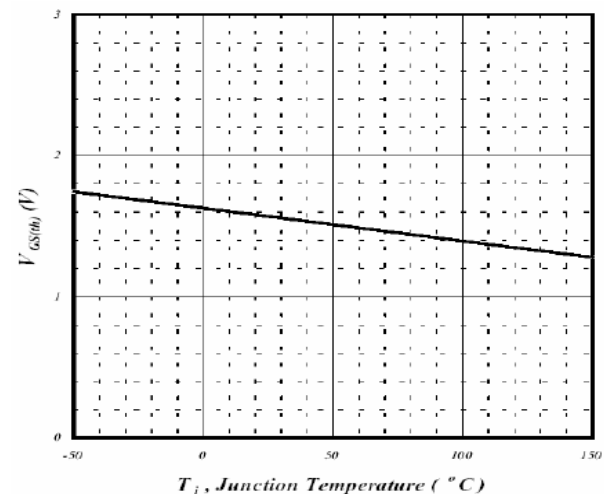
**Fig 9. Gate Charge Characteristics**



**Fig 10. Typical Capacitance Characteristics**

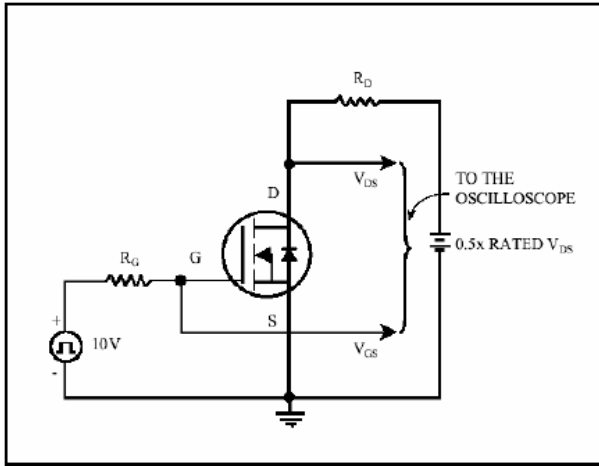


**Fig 11. Forward Characteristics of Reverse Diode**

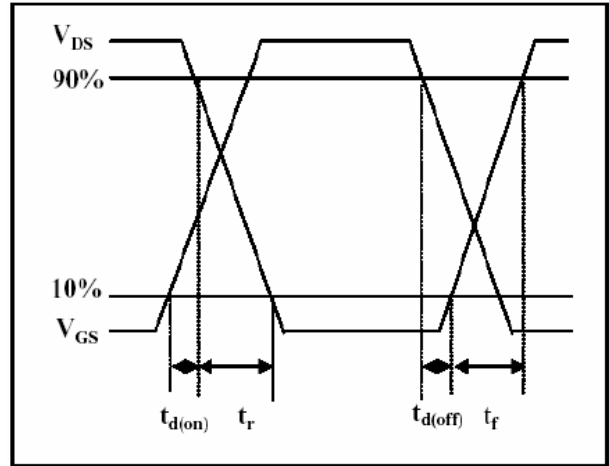


**Fig 12. Gate Threshold Voltage v.s. Junction Temperature**

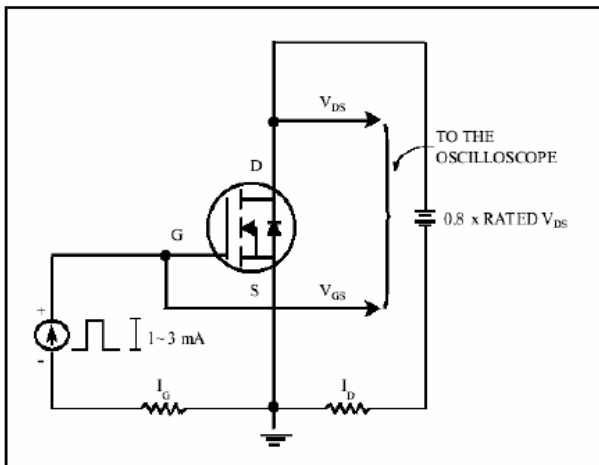
**Test Circuits and Waveforms**



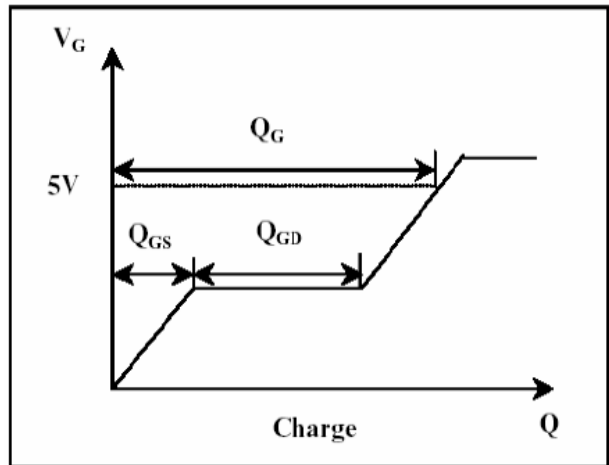
**Fig 13. Switching Time Circuit**



**Fig 14. Switching Time Waveform**



**Fig 15. Gate Charge Circuit**

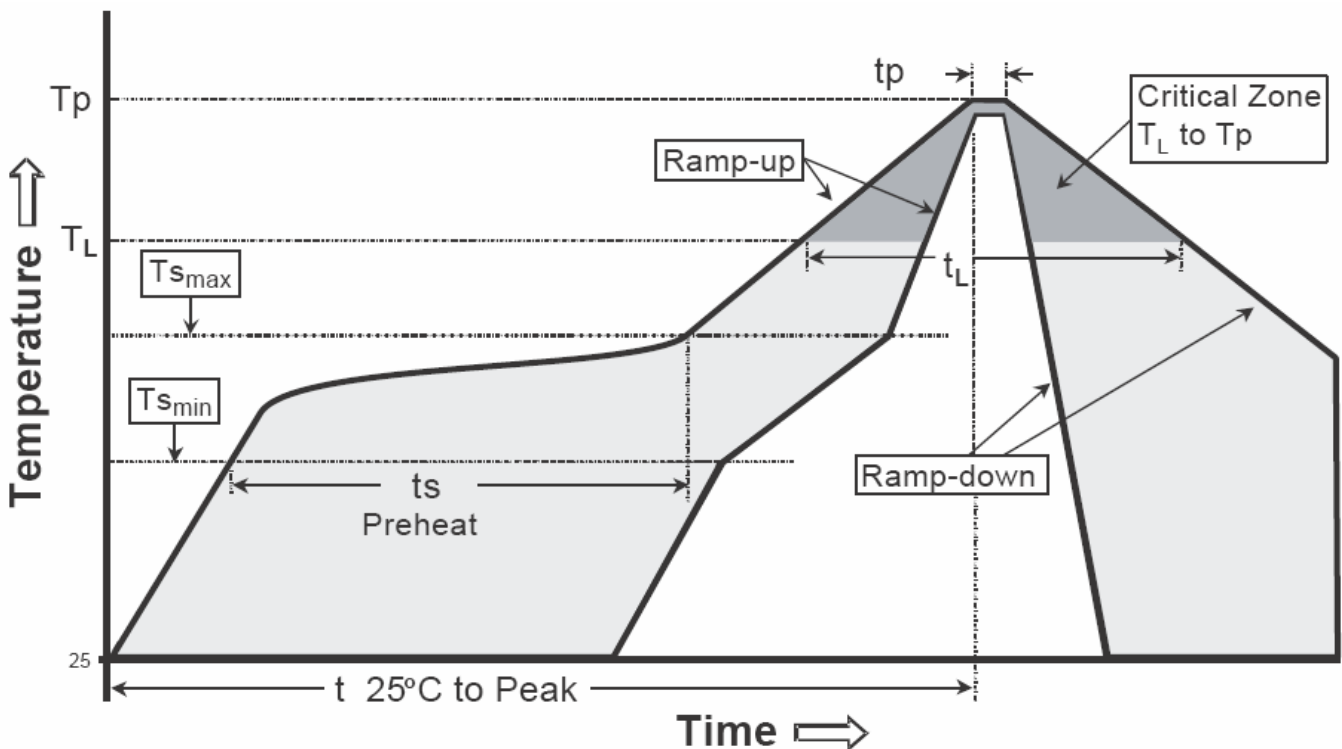


**Fig 16. Gate Charge Waveform**

**Recommended wave soldering condition**

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

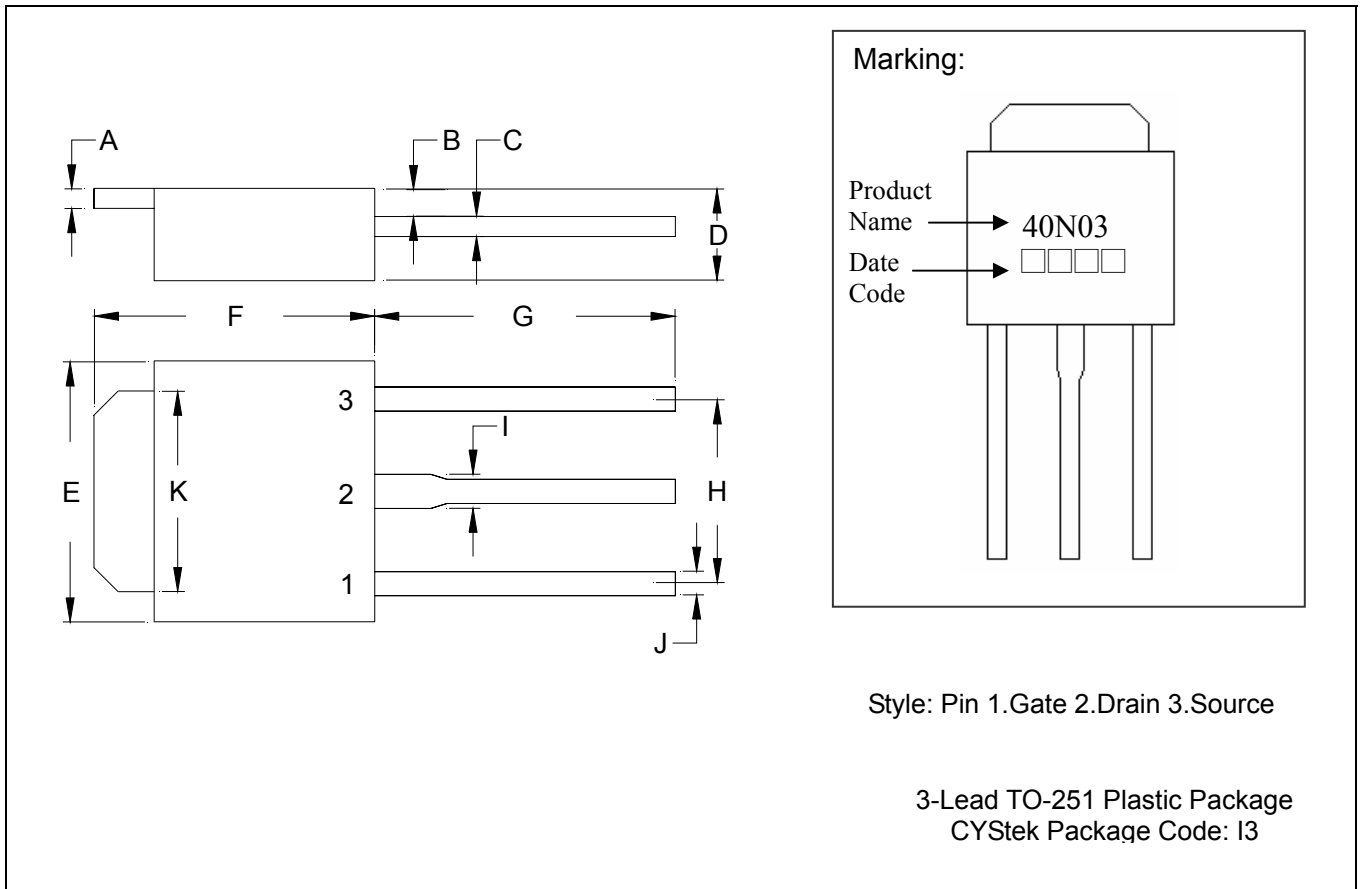
**Recommended temperature profile for IR reflow**



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub> )	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-251 Dimension**



Marking:

Product Name → 40N03  
 Date Code → □□□□

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

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

\*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.0177	0.0217	0.45	0.55	G	0.2559	-	6.50	-
B	0.0354	0.0591	0.90	1.50	H	-	*0.1811	-	*4.60
C	0.0177	0.0236	0.45	0.60	I	-	0.0449	-	1.14
D	0.0866	0.0945	2.20	2.40	J	-	0.0346	-	0.88
E	0.2441	0.2677	6.20	6.80	K	0.2047	0.2165	5.20	5.50
F	0.2677	0.2835	6.80	7.20					

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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