

P-CHANNEL Enhancement Mode MOSFET

MTP2303N3

Description

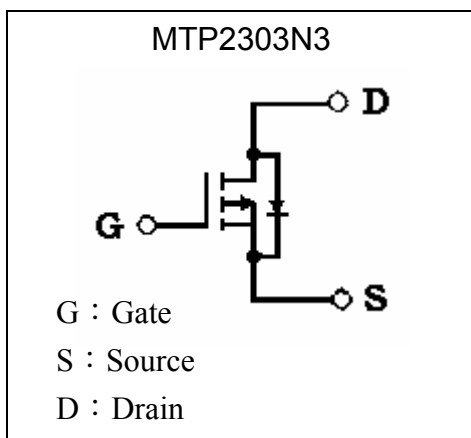
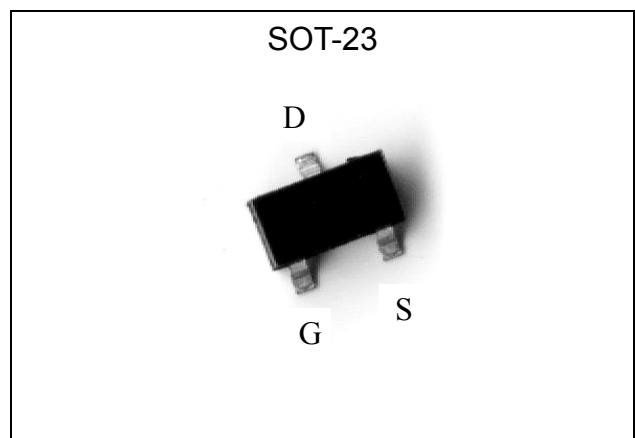
The MTP2303N3 is a P-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness.

Features

- $V_{DS} = -30V$
 $R_{DS(ON)} = 240m\Omega @ V_{GS} = -10V, I_{DS} = -1.7A$
- Advanced trench process technology
- Super high dense cell design for extremely low on resistance
- Reliable and rugged
- Compact and low profile SOT-23 package
- Pb-free package

Applications

- Power management in Notebook Computer
- Portable equipment
- Battery powered system

Equivalent Circuit**Outline**



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V _{DS}	-30	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current @T _A =25°C (Note 1)	I _D	-1.9	A
Continuous Drain Current @T _A =70°C (Note 1)	I _D	-1.5	A
Pulsed Drain Current (Note 2)	I _{DM}	-10	A
Maximum Power Dissipation (Note 3)	P _D	1.38	W
Linear Derating Factor		0.01	W/°C
Operating Junction and Storage Temperature Range	T _j , T _{stg}	-55~+150	°C

- Note : 1. Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
 2. Pulse width limited by maximum junction temperature.
 3. Surface mounted on 1 in² copper pad of FR-4 board, 270°C/W when mounted on minimum copper pad.

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient	R _{th,ja}	90	°C/W

Note : Surface mounted on 1 in² copper pad of FR-4 board, 270°C/W when mounted on minimum copper pad.

Electrical Characteristics (T_j=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	-30	-	-	V	V _{GS} =0, I _D =-250μA
ΔBV _{DSS} /ΔT _j	-	-0.1	-	V/°C	Reference to 25°C, I _D =-1mA
V _{GS(th)}	-1.0	-	-	V	V _{DS} =V _{GS} , I _D =-250μA
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0
I _{DSS}	-	-	-1	μA	V _{DS} =-30V, V _{GS} =0
	-	-	-10	μA	V _{DS} =-30V, V _{GS} =0, T _j =70°C
*R _{DSON}	-	-	240	mΩ	I _D =-1.7A, V _{GS} =-10V
	-	-	460		I _D =-1.3A, V _{GS} =-4.5V
*G _{FS}	-	2	-	S	V _{DS} =-10V, I _D =-1.7A
Dynamic					
C _{iSS}	-	230	-	pF	V _{DS} =-15V, V _{GS} =0, f=1MHz
C _{oSS}	-	130.4	-		
C _{rSS}	-	40	-		
*t _{d(ON)}	-	7.6	-	ns	V _{DS} =-15V, I _D =-1A, V _{GS} =-10V, R _G =6Ω, R _D =15Ω
*t _r	-	8.2	-		
*t _{d(OFF)}	-	17.5	-		
*t _f	-	9	-		
*Q _g	-	6.2	-	nC	V _{DS} =-15V, I _D =-1.7A, V _{GS} =-10V
*Q _{gs}	-	1.4	-		
*Q _{gd}	-	0.3	-		

Electrical Characteristics (Tj=25°C, unless otherwise specified) ---Cont.

Source-Drain Diode					
*V _{SD}	-	-	-1.2	V	V _{GS} =0V, I _{SD} =-1.25A, T _j =25°C
*I _{SD}	-	-	-1	A	V _D =V _G =0, V _S =-1.2V
*I _{SM}	-	-	-10	A	

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

Ordering Information

Device	Package	Shipping	Marking
MTP2303N3	SOT-23 (Pb-free)	3000 pcs / Tape & Reel	2303

Moisture Sensitivity Level : conform to JEDEC level 3

Recommended Storage Condition:

Temperature : 10~ 35 °C

Humidity : 30~ 60% RH

Characteristic Curves

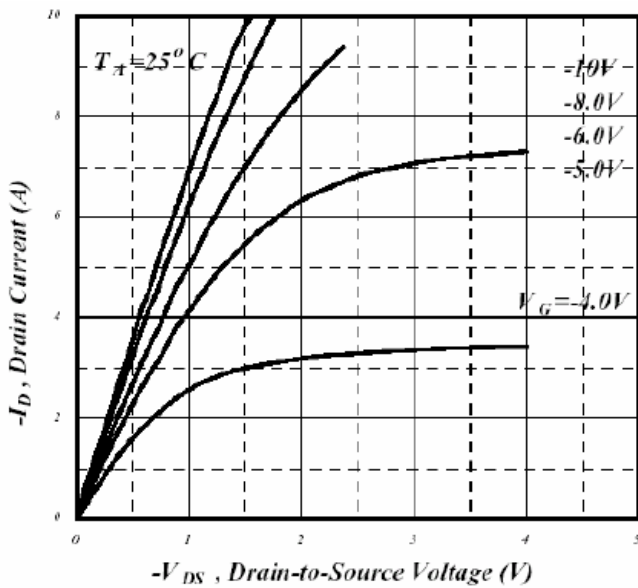


Fig 1. Typical Output Characteristics

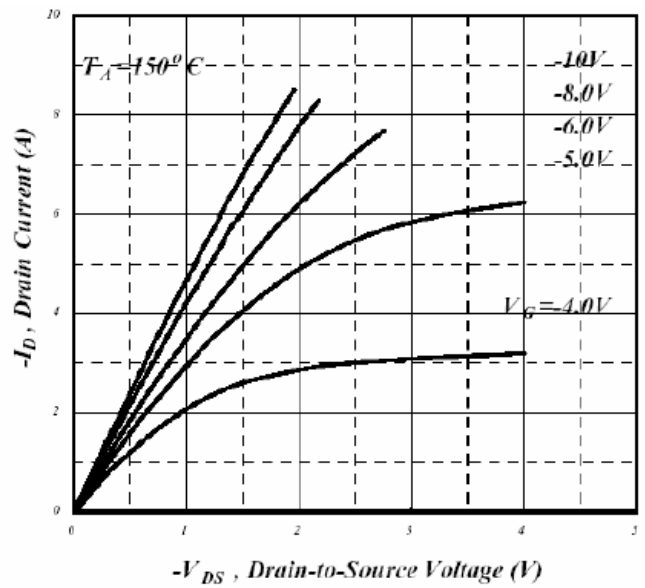


Fig 2. Typical Output Characteristics

Characteristic Curves(Cont.)

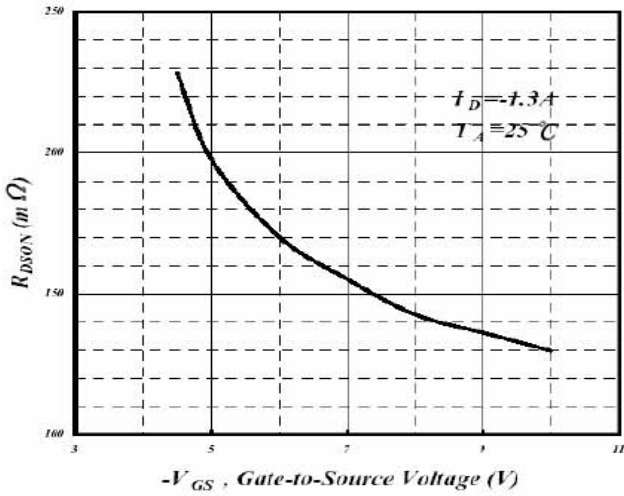


Fig 3. On-Resistance v.s. Gate Voltage

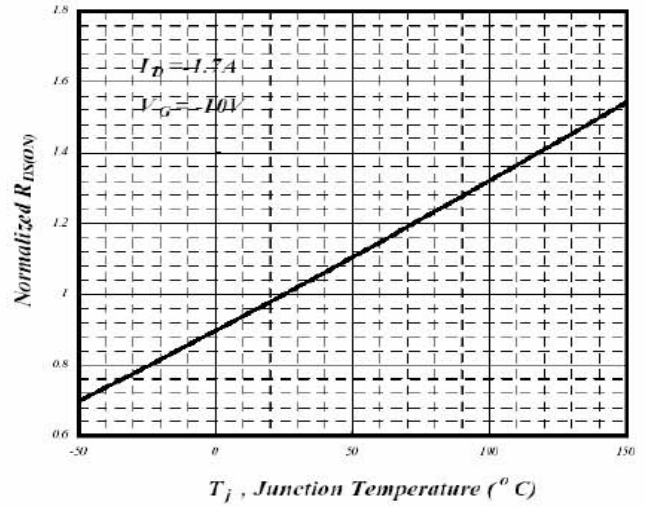


Fig 4. Normalized On-Resistance

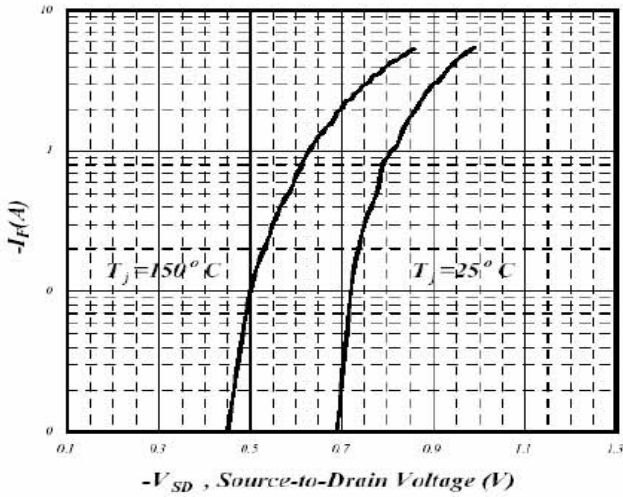


Fig 5. Forward Characteristic of Reverse Diode

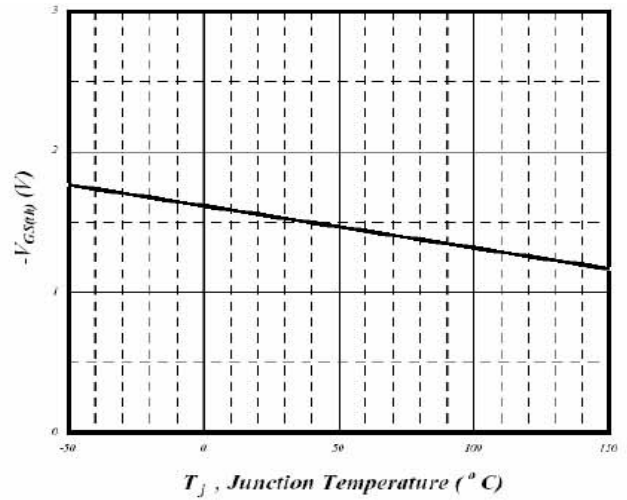


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

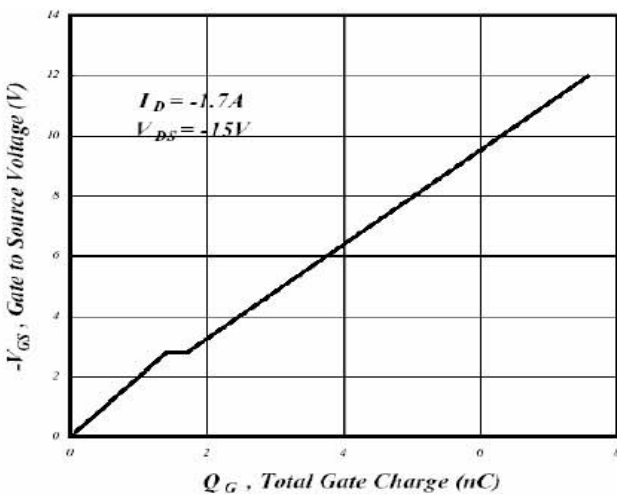


Fig 7. Gate Charge Characteristics

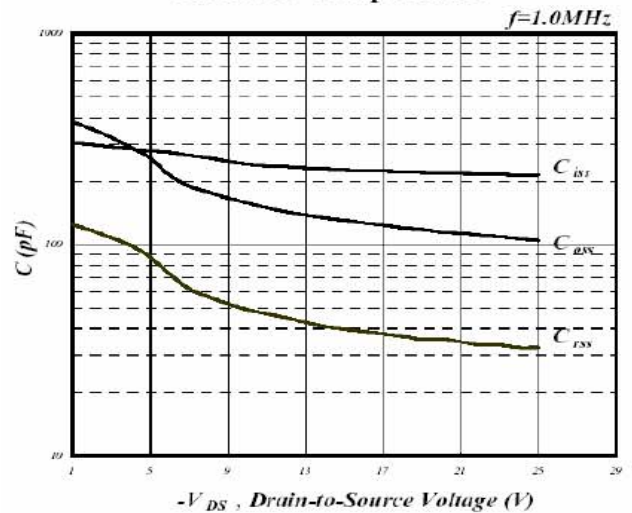


Fig 8. Typical Capacitance Characteristics

Characteristic Curves(Cont.)

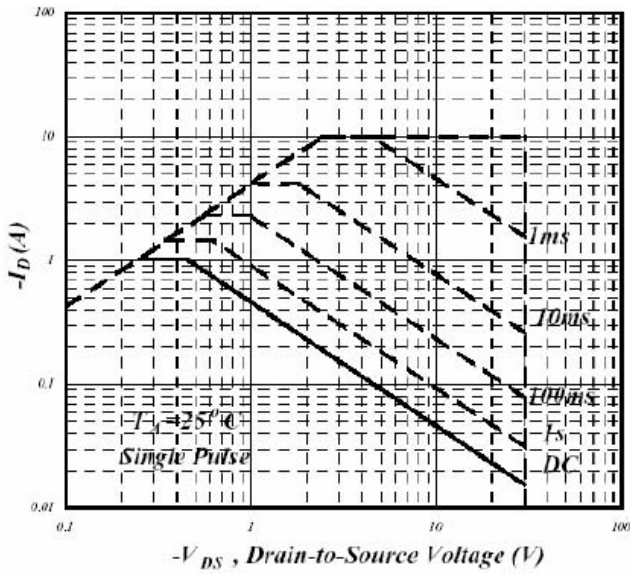


Fig 9. Maximum Safe Operating Area

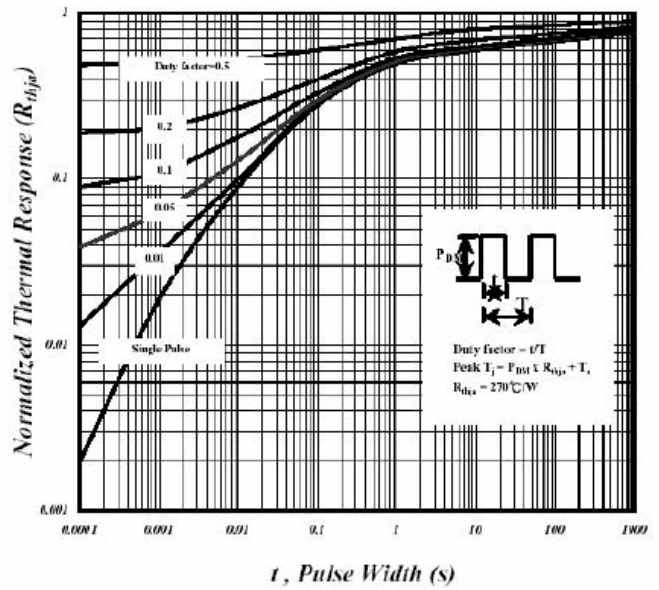


Fig 10. Effective Transient Thermal Impedance

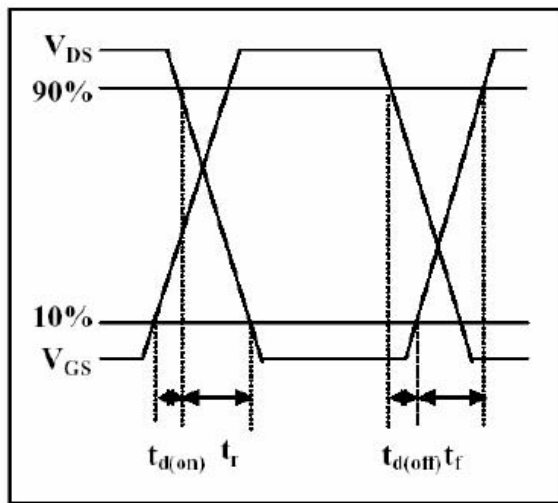


Fig 11. Switching Time Waveform

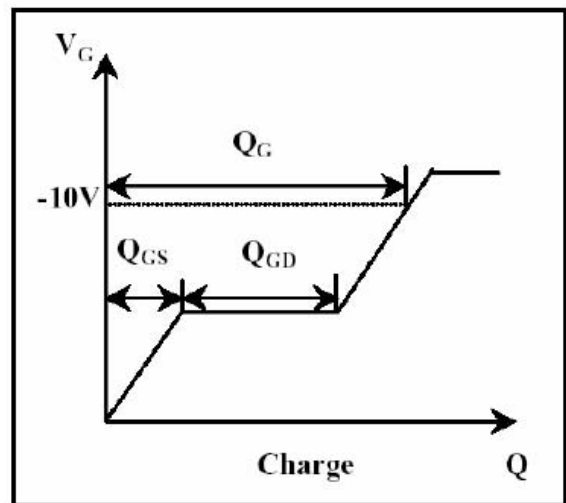
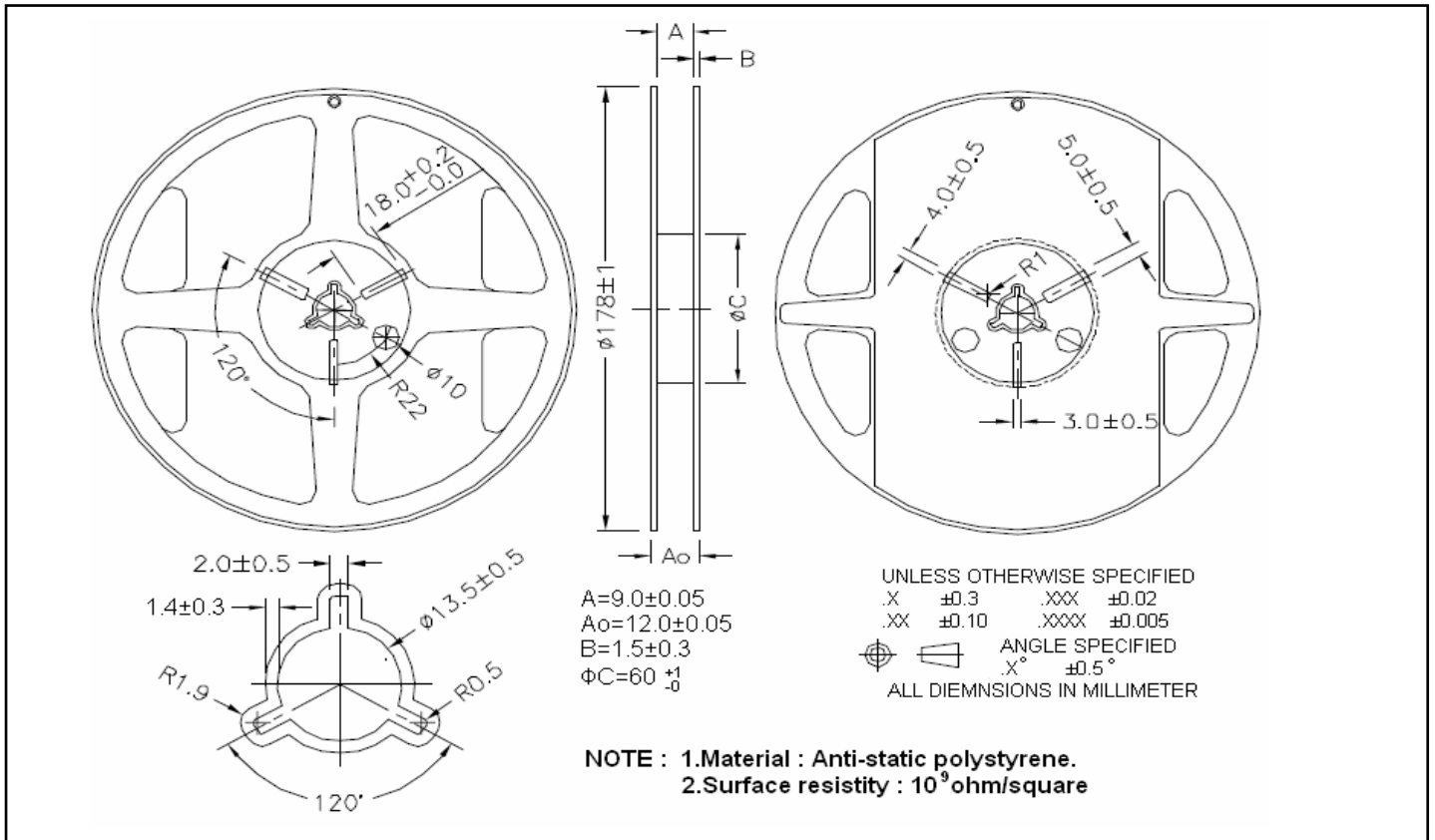
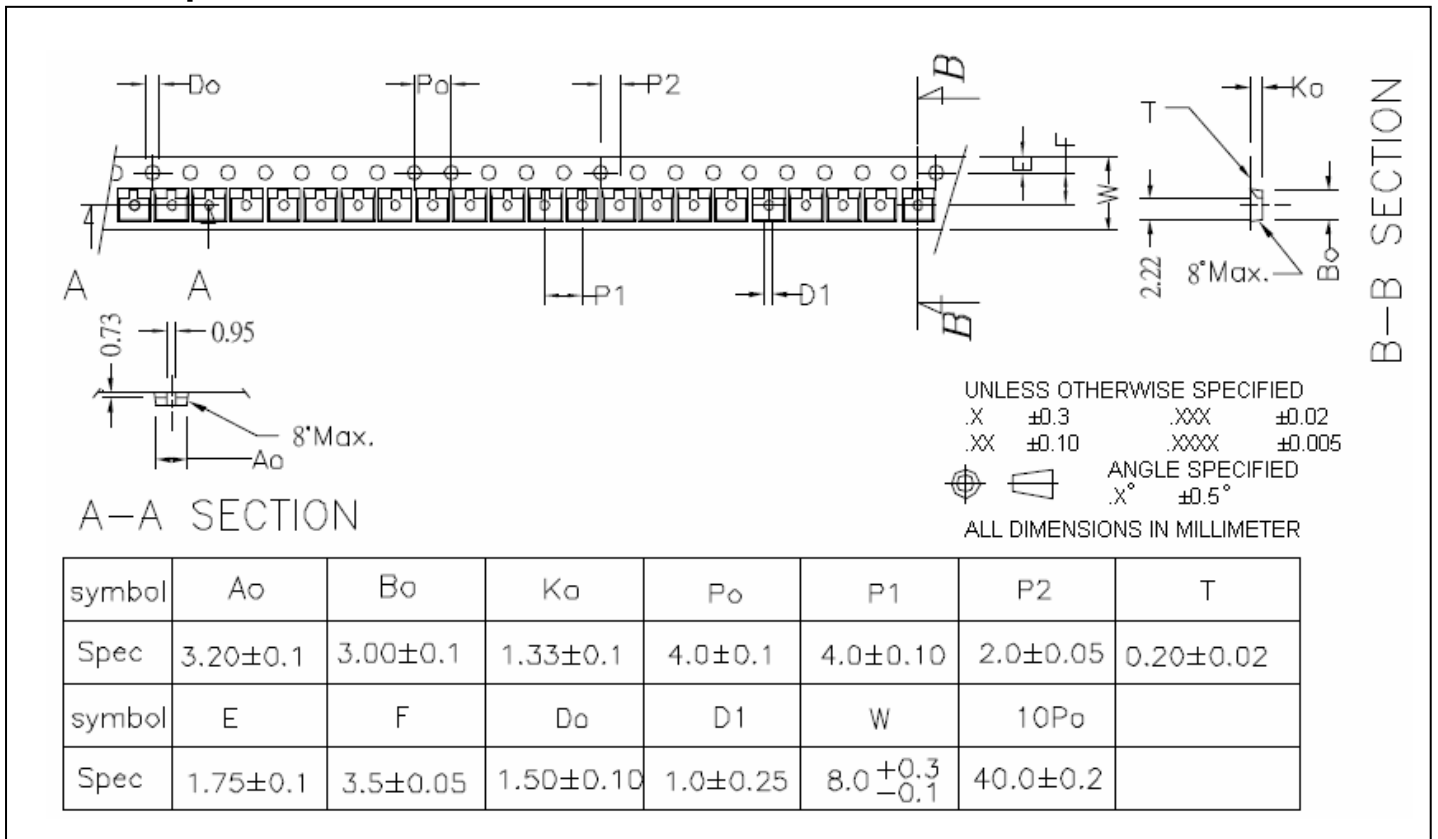


Fig 12. Gate Charge Waveform

Reel Dimension



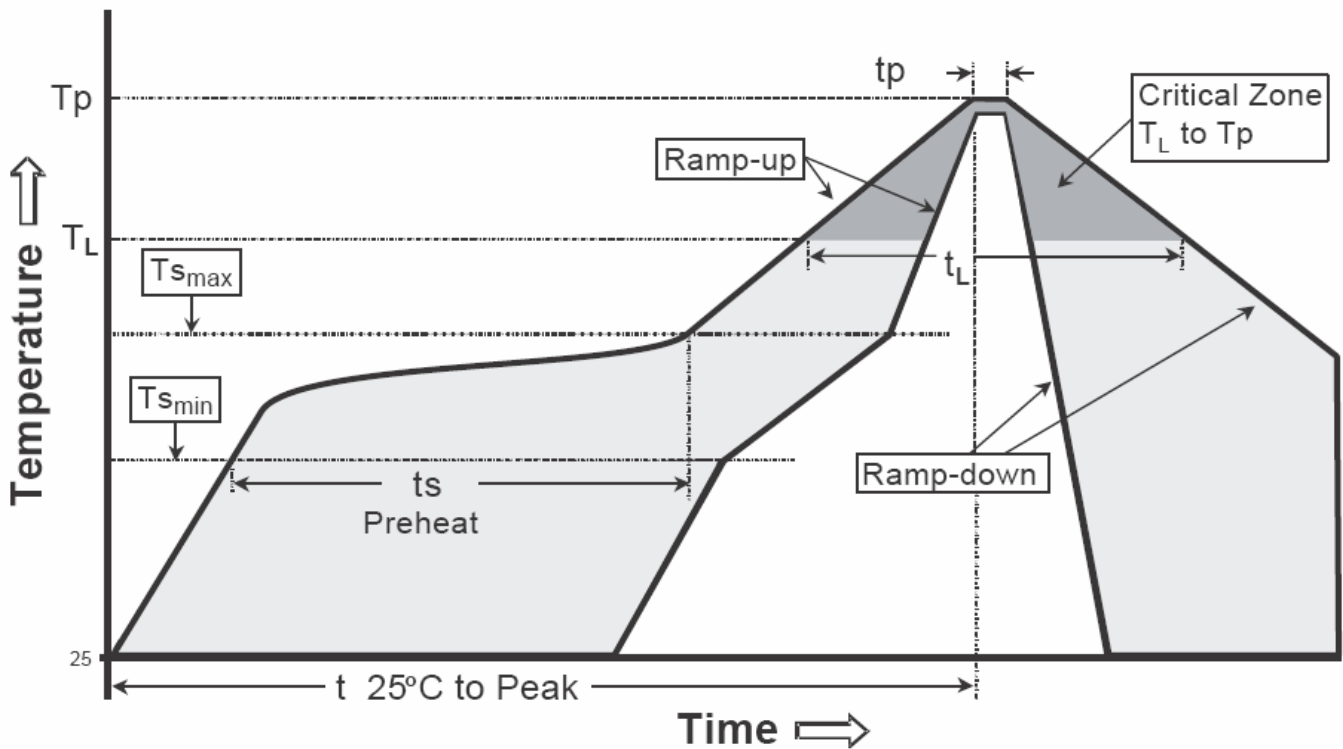
Carrier Tape Dimension



Recommended wave soldering condition

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

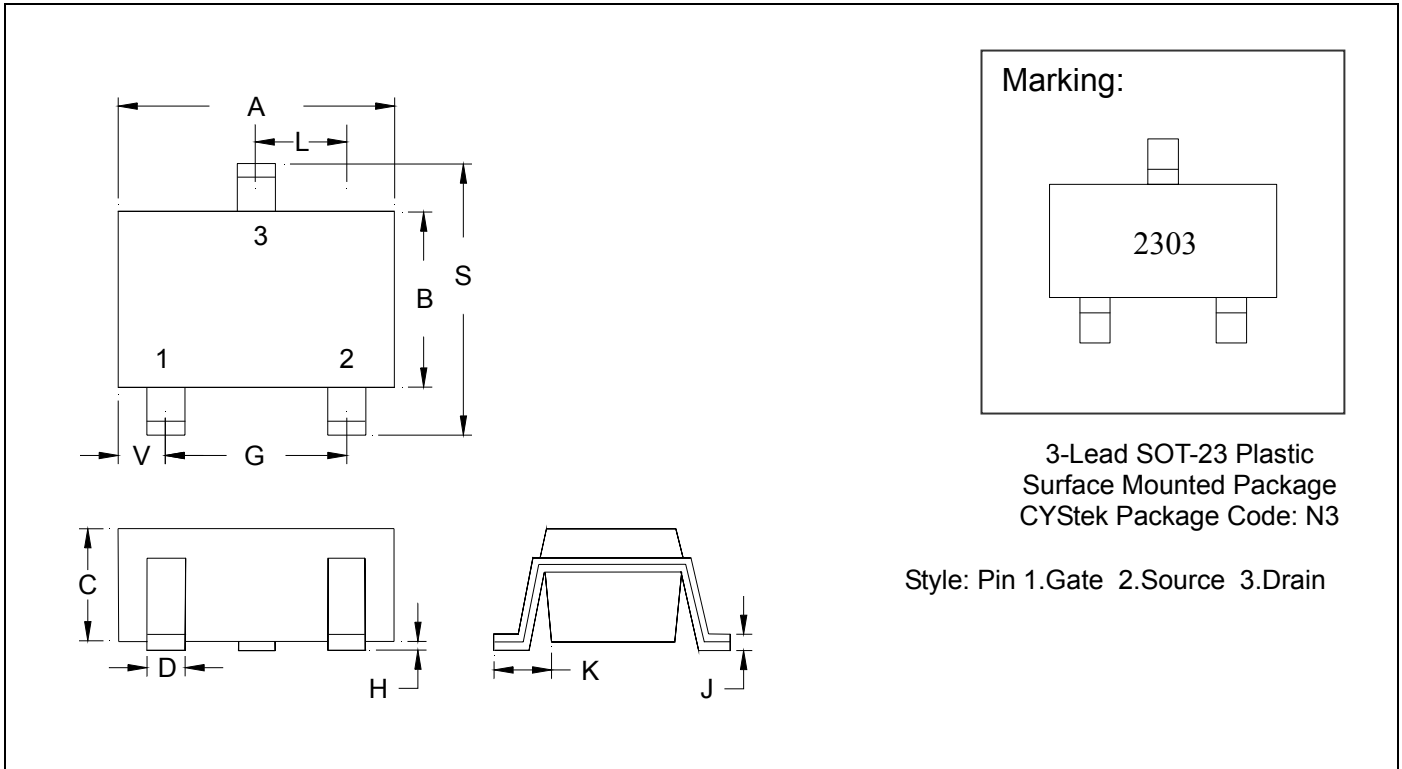
Recommended temperature profile for IR reflow



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.

SOT-23 Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1102	0.1204	2.80	3.04	J	0.0034	0.0070	0.085	0.177
B	0.0472	0.0630	1.20	1.60	K	0.0128	0.0266	0.32	0.67
C	0.0335	0.0512	0.89	1.30	L	0.0335	0.0453	0.85	1.15
D	0.0118	0.0197	0.30	0.50	S	0.0830	0.1083	2.10	2.75
G	0.0669	0.0910	1.70	2.30	V	0.0098	0.0256	0.25	0.65
H	0.0005	0.0040	0.013	0.10					

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: 42 Alloy ; solder plating
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

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