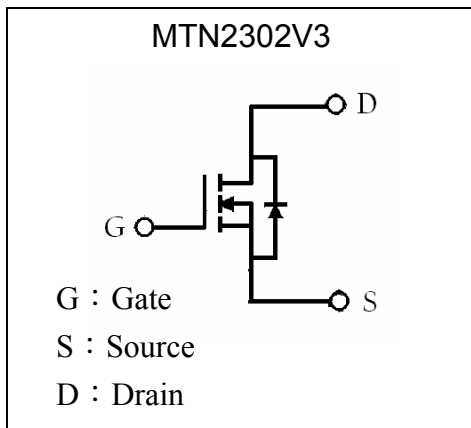
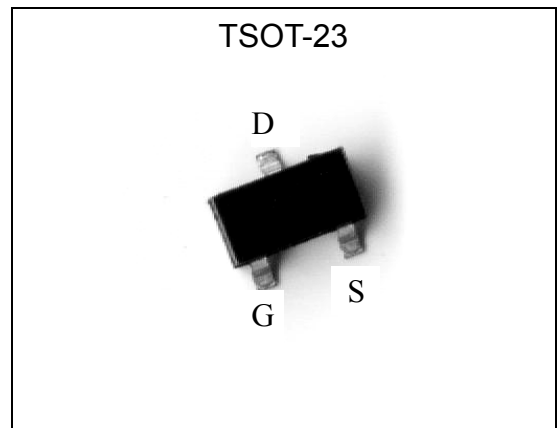


20V N-CHANNEL Enhancement Mode MOSFET

MTN2302V3

Features

- $V_{DS}=20V$
 $R_{DS(ON)}=85m\Omega$ (max.)@ $V_{GS}=4.5V$, $I_{DS}=3.6A$
 $R_{DS(ON)}=115m\Omega$ (max.)@ $V_{GS}=2.5V$, $I_{DS}=3.1A$
- Simple drive requirement
- Small package outline
- Capable of 2.5V gate drive
- Pb-free package

Symbol

Outline

Absolute Maximum Ratings ($T_A=25^{\circ}C$)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 8	V
Continuous Drain Current @ $V_{GS}=4.5V$, $T_A=25^{\circ}C$ (Note 3)	I_D	3.2	A
Continuous Drain Current @ $V_{GS}=4.5V$, $T_A=70^{\circ}C$ (Note 3)		2.6	A
Pulsed Drain Current (Notes 1, 2)	I_{DM}	10	A
Maximum Power Dissipation@ $T_A=25^{\circ}C$	P_D	1.38	W
Linear Derating Factor		0.01	W/ $^{\circ}C$
Operating Junction and Storage Temperature	T_j, T_{stg}	-55~+150	$^{\circ}C$

Note : 1. Pulse width limited by maximum junction temperature.

2. Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

3. Surface mounted on 1 in² copper pad of FR-4 board; 270 $^{\circ}C/W$ when mounted on minimum copper pad

**Thermal Performance**

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient(PCB mounted)	Rth _{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 noted)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	20	-	-	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)}	0.5	-	1.2	V	V _{DS} =V _{GS} , I _D =250μA
I _{GSS}	-	-	±100	nA	V _{GS} =±8V, V _{DS} =0
I _{DSS}	-	-	1	μA	V _{DS} =20V, V _{GS} =0
	-	-	10	μA	V _{DS} =20V, V _{GS} =0 (T _j =70°C)
*R _{DS(ON)}	-	32	85	mΩ	I _D =3.6A, V _{GS} =4.5V
	-	44	115		I _D =3.1A, V _{GS} =2.5V
*G _{FS}	-	7	-	S	V _{DS} =5V, I _D =3.6A
Dynamic					
C _{iss}	-	145	-	pF	V _{DS} =10V, V _{GS} =0, f=1MHz
C _{oss}	-	100	-		
C _{rss}	-	50	-		
t _{d(ON)}	-	5.2	-	ns	V _{DS} =10V, I _D =3.6A, V _{GS} =5V R _G =6Ω, R _D =2.8Ω
t _r	-	37	-		
t _{d(OFF)}	-	15	-		
t _f	-	5.7	-		
Q _g	-	4.4	-	nC	V _{DS} =10V, I _D =3.6A, V _{GS} =4.5V
Q _{gs}	-	0.6	-		
Q _{gd}	-	1.9	-		
Source-Drain Diode					
*V _{SD}	-	-	1.2	V	V _{GS} =0V, I _S =1.0A
I _S	-	-	1	A	V _D =V _G =0V, V _S =1.2V
I _{SM}	-	-	10		

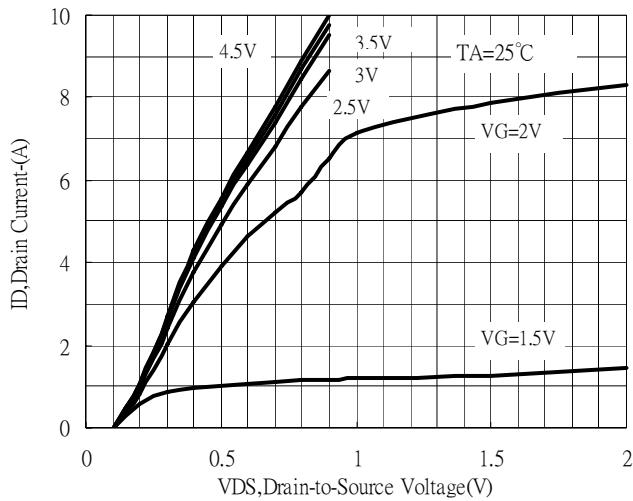
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Ordering Information

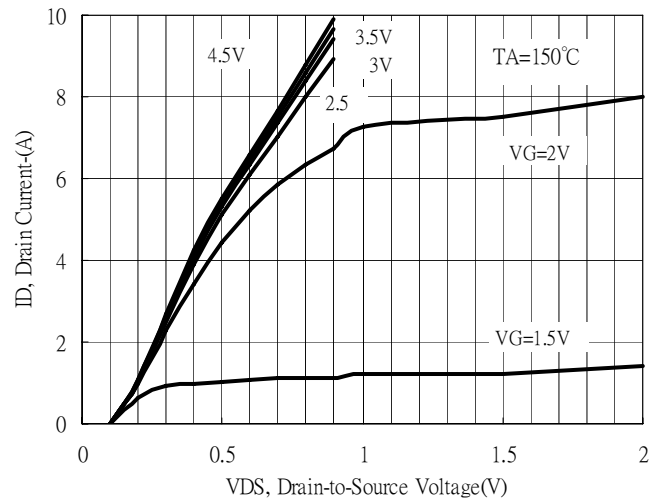
Device	Package	Shipping	Marking
MTN2302V3	TSOT-23 (Pb-free)	3000 pcs / Tape & Reel	02

Characteristic Curves

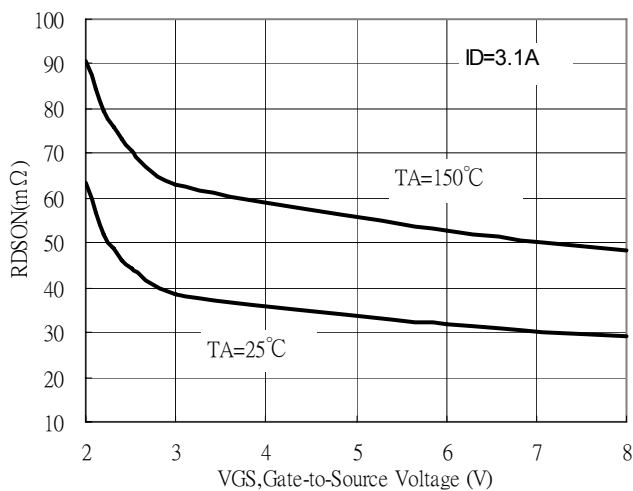
Typical Output Characteristics



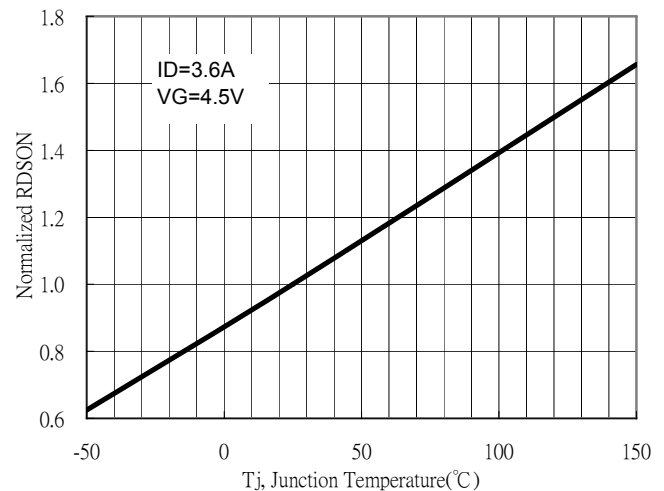
Typical Output Characteristics



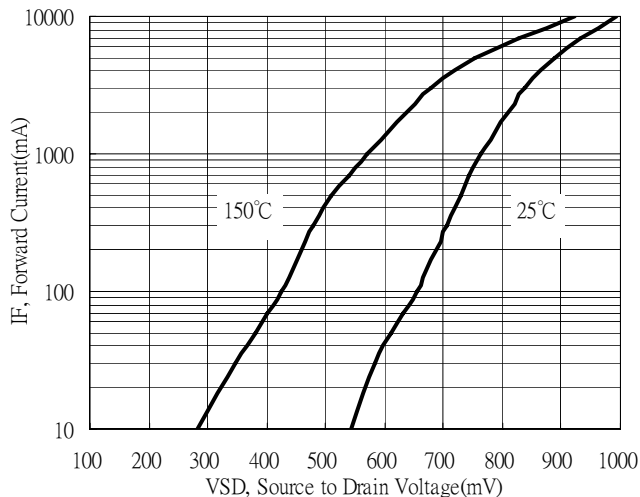
On-Resistance vs Gate Voltage



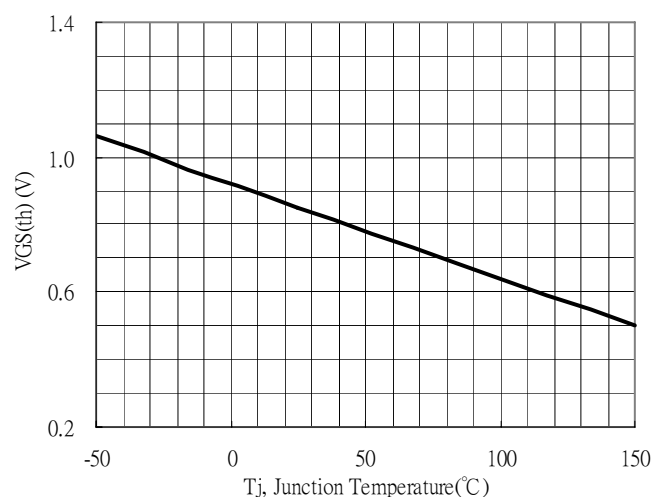
Normalized On-Resistance vs Junction Temperature



Forward Characteristics of Reverse Diode

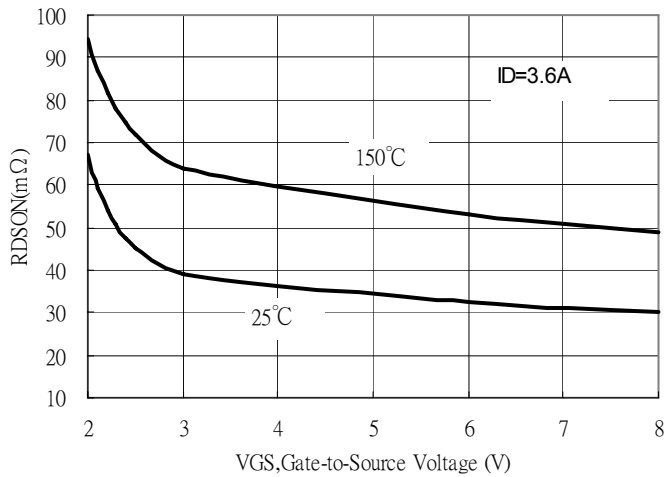


Gate Threshold Voltage vs Junction Temperature

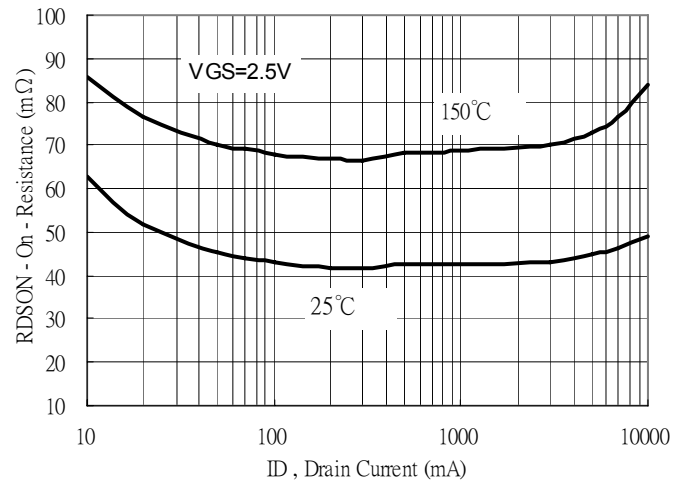


Characteristic Curves(Cont.)

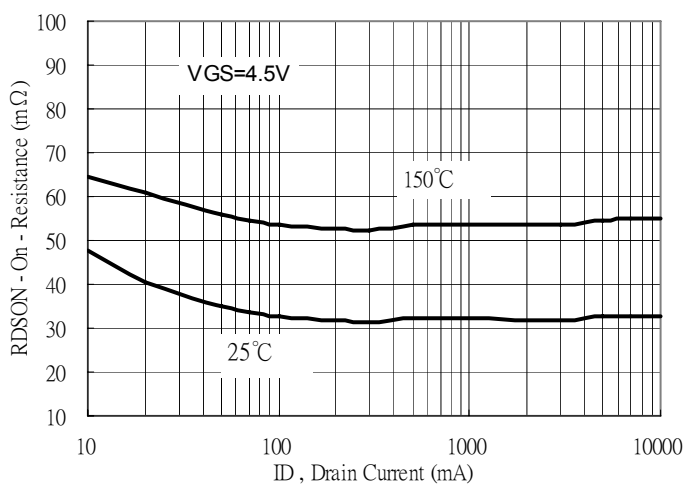
On-Resistance vs Gate Voltage



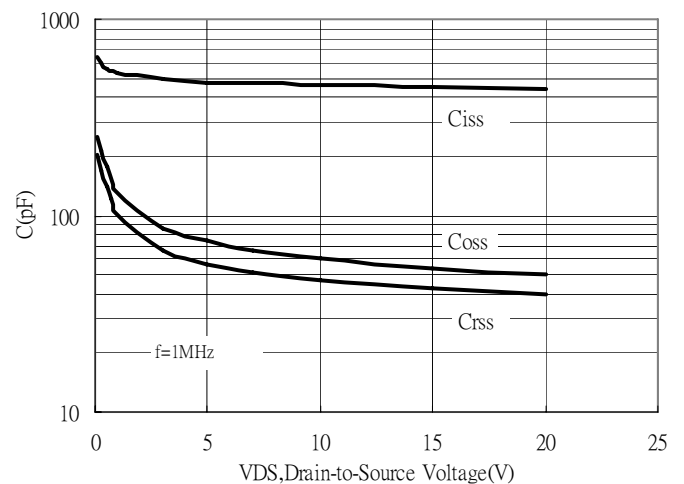
Drain-Source On Resistance



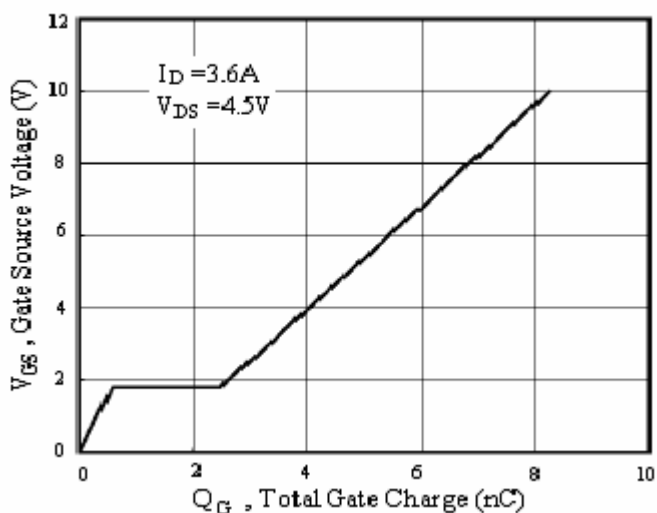
Drain-Source On Resistance



Typical Capacitance Characteristics

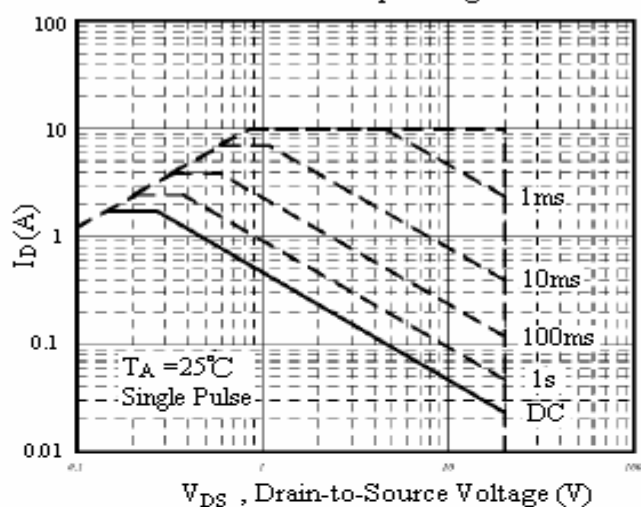


Gate Charge Characteristics

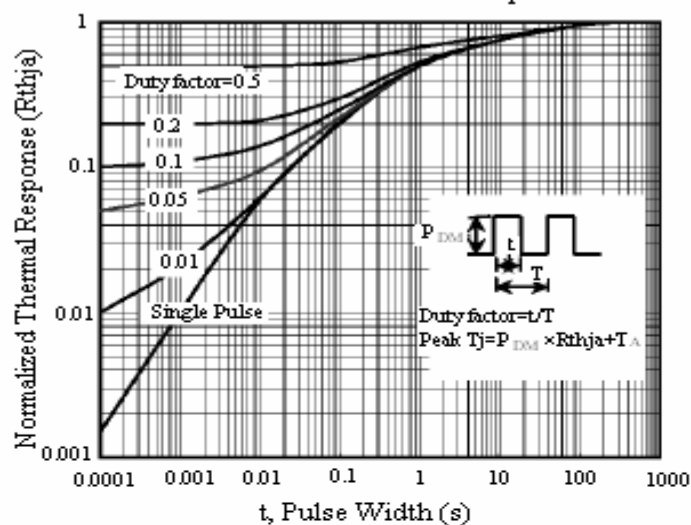


Characteristic Curves(Cont.)

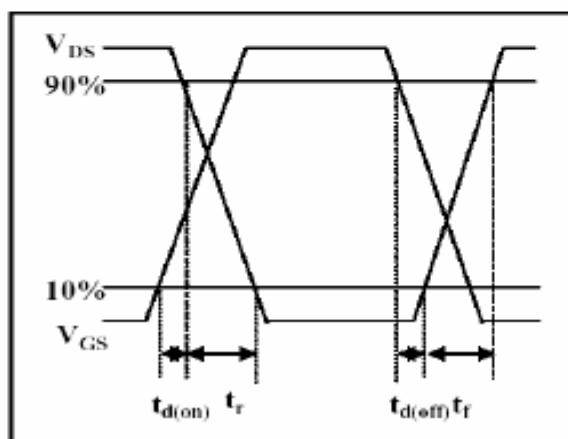
Maximum Safe Operating Area



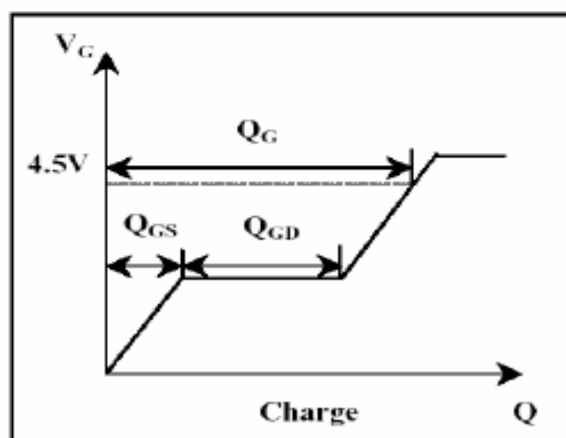
Effective Transient Thermal Impedance



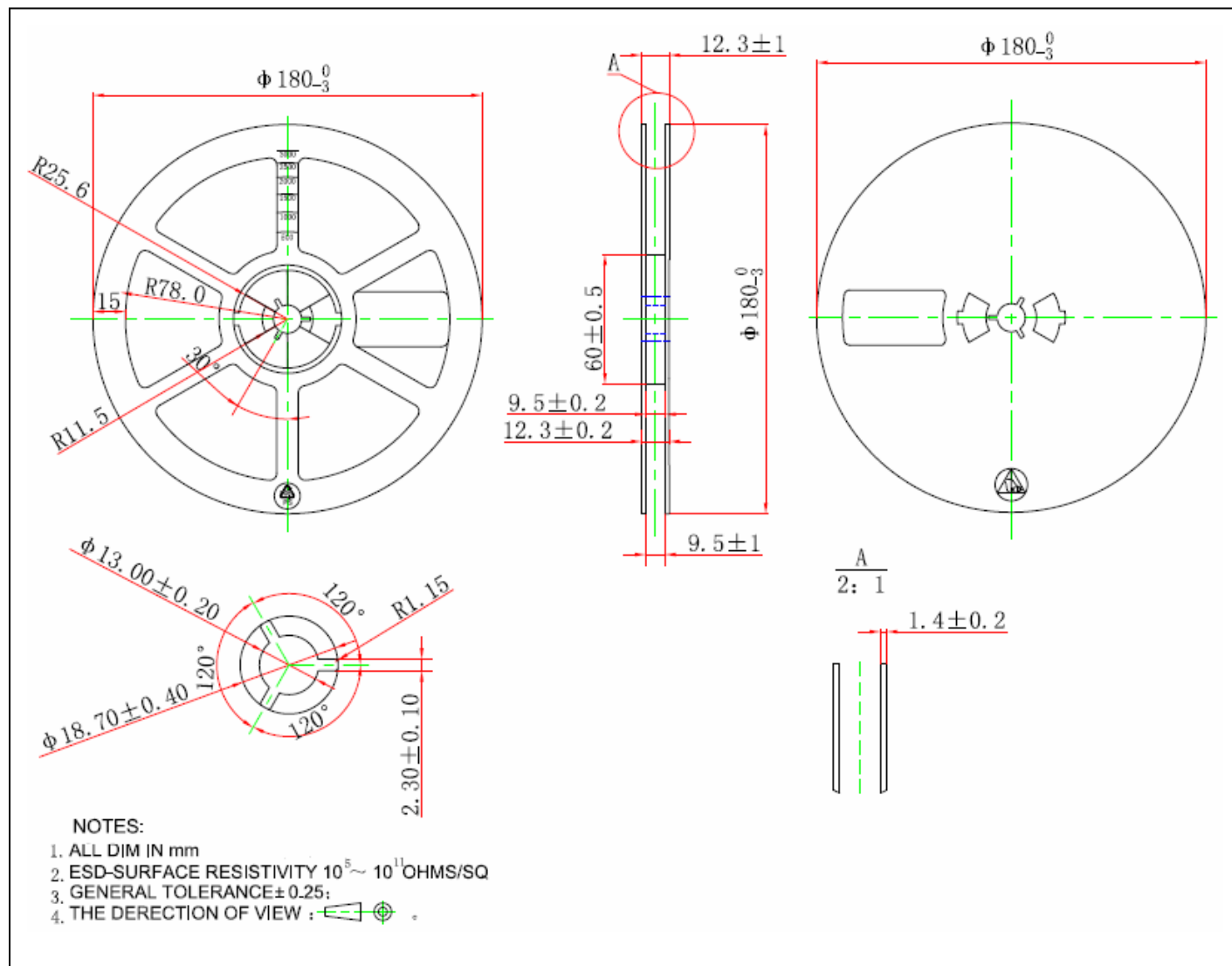
Switching Time Waveform



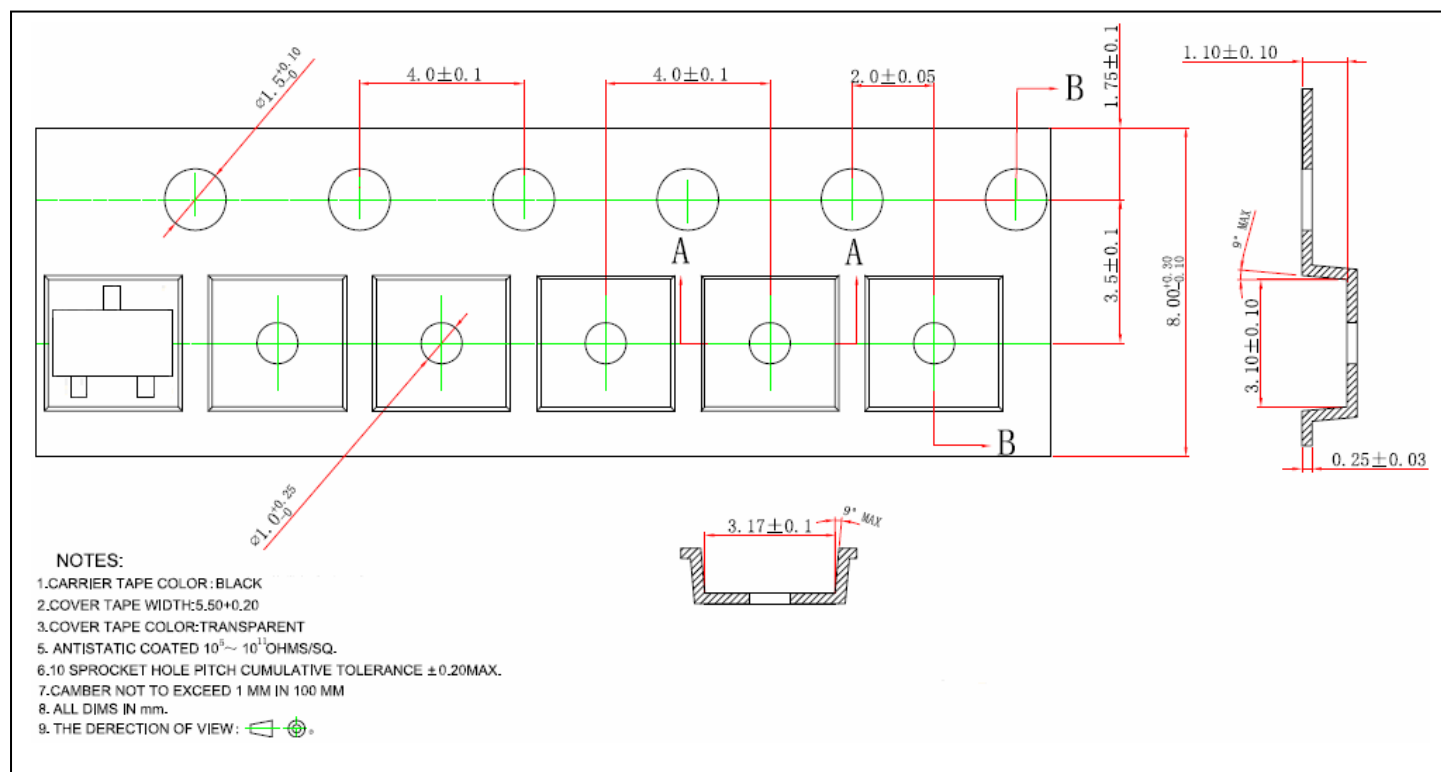
Gate Charge Waveform



Reel Dimension



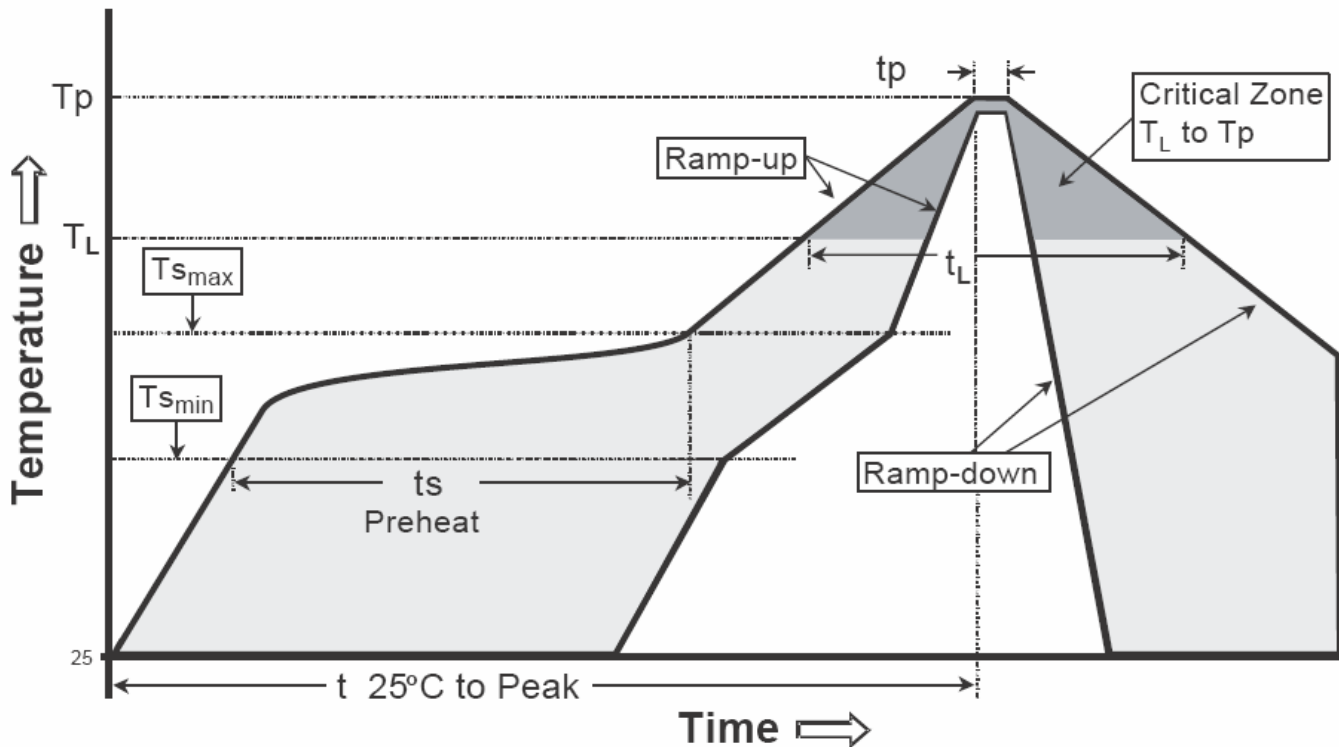
Carrier Tape Dimension



Recommended wave soldering condition

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

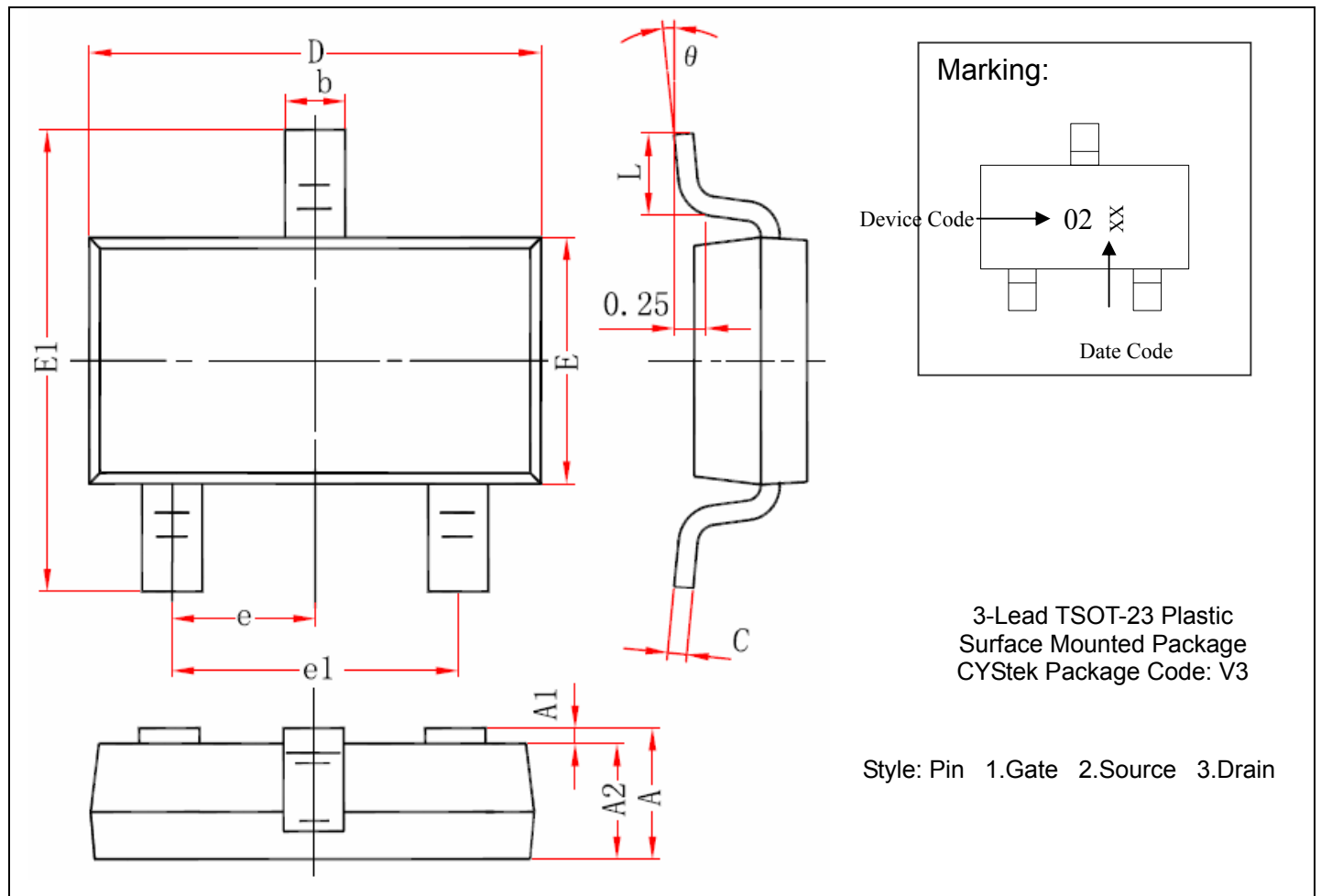
Recommended temperature profile for IR reflow



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_{smin}) -Temperature Max(T_{smax}) -Time(t_{smin} to t_{smax})	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: -Temperature (T_L) - Time (t_L)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(T_p)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(t_p)	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.

TSOT-23 Dimension



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.028	0.035	0.700	0.900	E	0.063	0.067	1.600	1.700
A1	0.000	0.004	0.000	0.100	E1	0.104	0.116	2.650	2.950
A2	0.028	0.031	0.700	0.800	e	0.037(BSC)		0.95(BSC)	
b	0.014	0.020	0.350	0.500	e1	0.075(BSC)		1.90(BSC)	
c	0.003	0.008	0.080	0.020	L	0.012	0.024	0.300	0.600
D	0.111	0.119	2.820	3.020	θ	0°	8°	0°	8°

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.

Important Notice:

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek **semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.**
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.