20V N-CHANNEL Enhancement Mode MOSFET

MTN1012C3

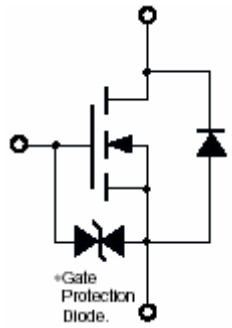
BV_{DSS}	20V
I_D	560mA
R_{DSON}@V_{GS}=4.5V, I_D=600mA	320mΩ(typ)
R_{DSON}@V_{GS}=2.5V,I_D=400mA	510mΩ(typ)
R_{DSON}@V_{GS}=1.8V,I_D=350mA	980mΩ(typ)

Features

- Simple drive requirement
- Small package outline
- Pb-free package

Symbol

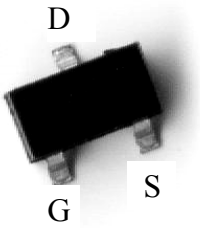
MTN1012C3



G：Gate
S：Source
D：Drain

Outline

SOT-523



Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±8	
Continuous Drain Current @ T_A=25°C, V_{GS}=4.5V (Note 3)		I_D	560	mA
Continuous Drain Current @ T_A=85°C, V_{GS}=4.5V (Note 3)			400	
Pulsed Drain Current (Notes 1, 2)		I_{DM}	2.5	A
Maximum Power Dissipation (Note 3)	T_A=25℃	P_D	150	mW
	T_A=85℃		80	
ESD susceptibility			2000 (Note 4)	V
Operating Junction and Storage Temperature		Tj, Tstg	-55~+150	°C

Note : 1. Pulse width limited by maximum junction temperature.
2. Pulse width≤ 300μs, duty cycle≤2%.
3. Surface mounted on FR-4 board.
3. Human body model, 1.5kΩ in series with 100pF

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient(PCB mounted)	Rth,ja	833	°C/W

Electrical Characteristics (Tj=25°C, unless otherwise noted)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	20	-	-	V	V_{GS}=0, I_D=250μA
$\Delta BV_{DSS}/\Delta Tj$	-	0.02	-	V/°C	Reference to 25°C, I_D=1mA
$V_{GS(th)}$	0.5	0.92	1.2	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±10	μA	V_{GS}=±8V, V_{DS}=0
I_{DSS}	-	-	1	μA	V_{DS}=20V, V_{GS}=0
	-	-	10	μA	V_{DS}=16V, V_{GS}=0 (Tj=70°C)
*$R_{DS(ON)}$	-	320	450	mΩ	V_{GS}=4.5V, I_D=600mA
	-	510	700	mΩ	V_{GS}=2.5V, I_D=500mA
	-	980	1200	mΩ	V_{GS}=1.8V, I_D=350mA
*G_{FS}	-	1	-	S	V_{DS}=10V, I_D=400mA
Dynamic					
Ciss	-	60	-	pF	V_{DS}=10V, V_{GS}=0, f=1MHz
Coss	-	14	-	pF	
Crss	-	9	-	pF	
$t_{d(ON)}$	-	5	-	ns	V_{DS}=10V, I_D=200mA, V_{GS}=4.5V R_G=10Ω
t_r	-	5	-	ns	
$t_{d(OFF)}$	-	24	-	ns	
t_f	-	18	-	ns	
Qg	-	0.76	-	nC	V_{DS}=10V, I_D=250mA, V_{GS}=4.5V
Qgs	-	0.074	-	nC	
Qgd	-	0.27	-	nC	
Source-Drain Diode					
*V_{SD}	-	0.8	1.2	V	V_{GS}=0V, I_S=150mA

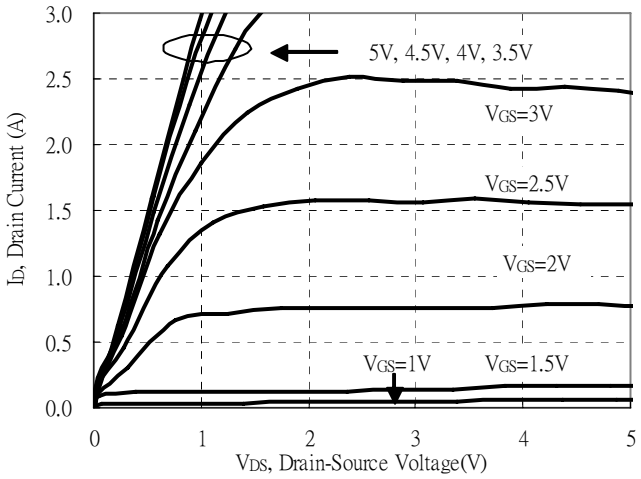
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Ordering Information

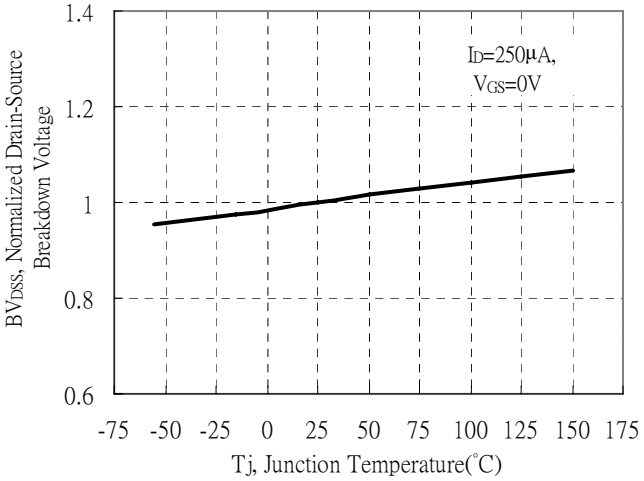
Device	Package	Shipping	Marking
MTN1012C3	SOT-523 (Pb-free package)	3000 pcs / Tape & Reel	QT

Typical Characteristics

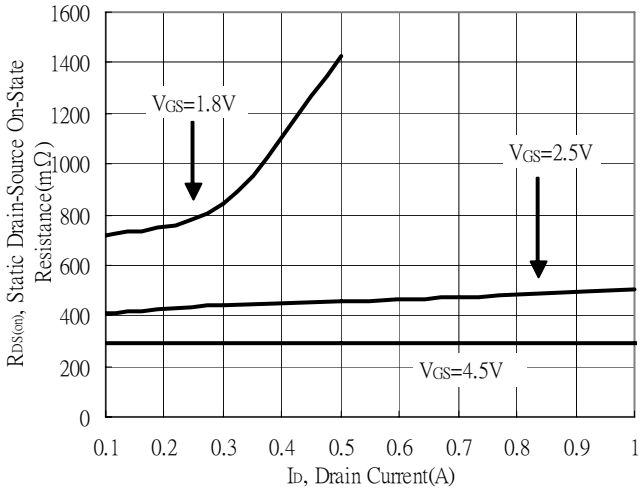
Typical Output Characteristics



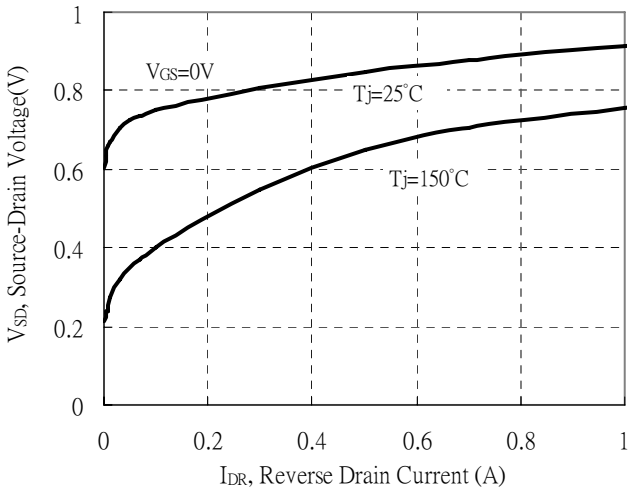
Brekdown Voltage vs Ambient Temperature



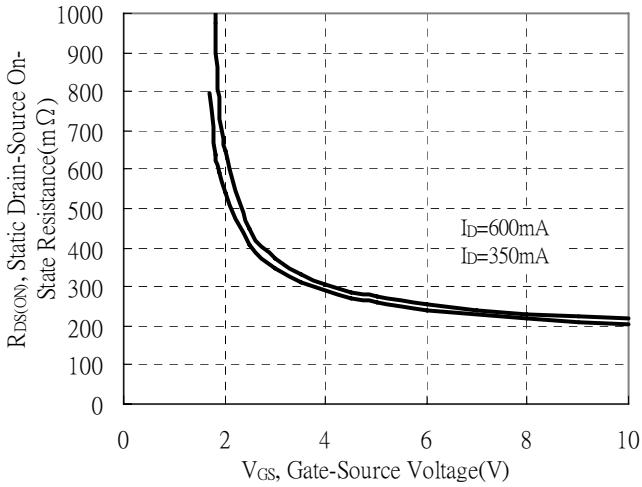
Static Drain-Source On-State resistance vs Drain Current



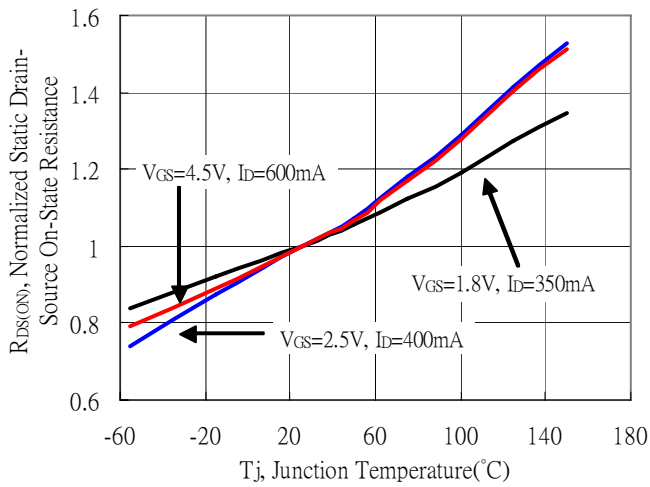
Reverse Drain Current vs Source-Drain Voltage



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

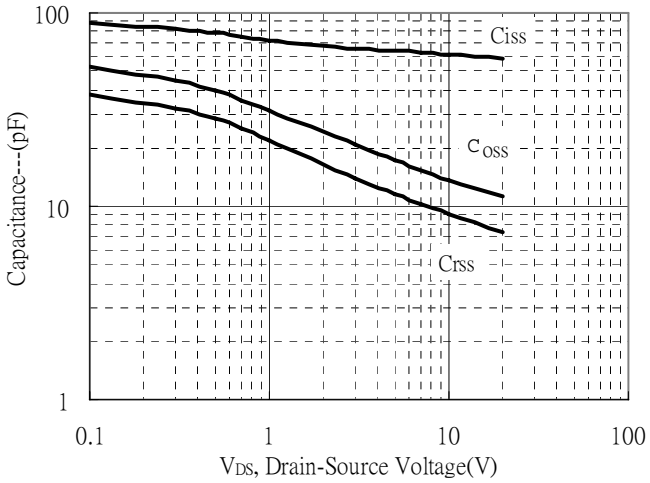


Drain-Source On-State Resistance vs Junction Tempearture

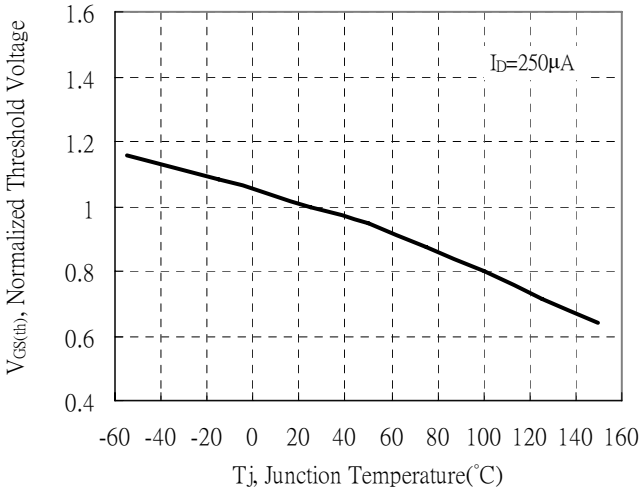


Typical Characteristics(Cont.)

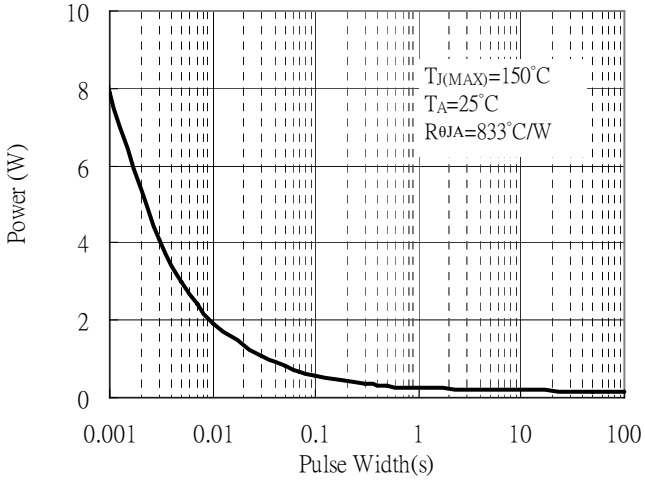
Capacitance vs Drain-to-Source Voltage



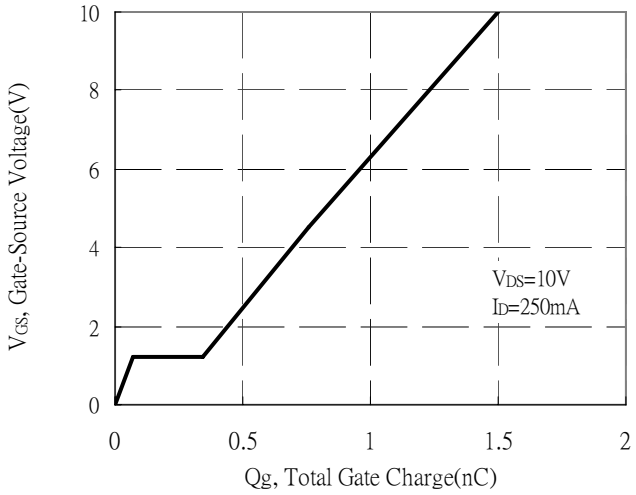
Threshold Voltage vs Junction Tempearture



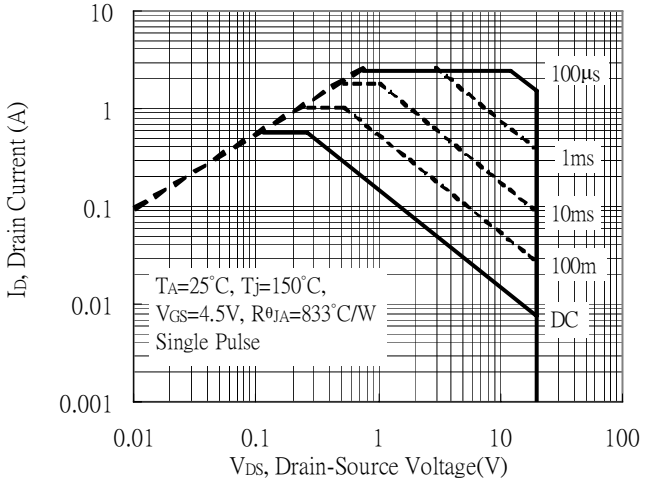
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



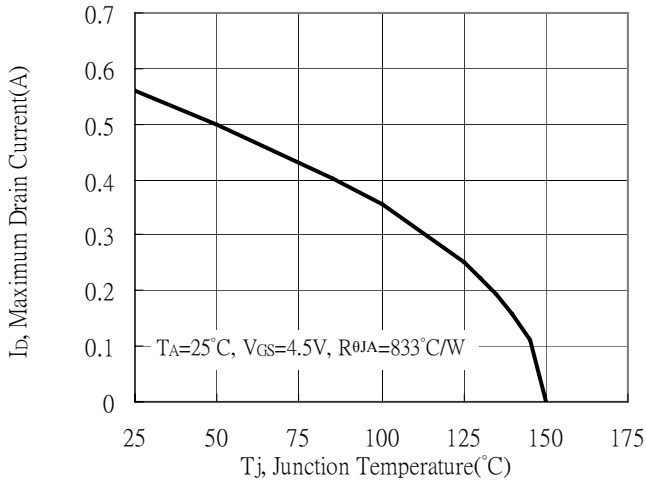
Gate Charge Characteristics



Maximum Safe Operating Area

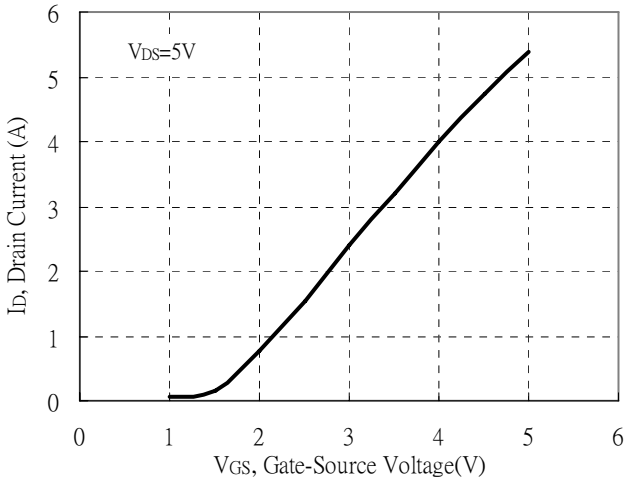


Maximum Drain Current vs JunctionTemperature

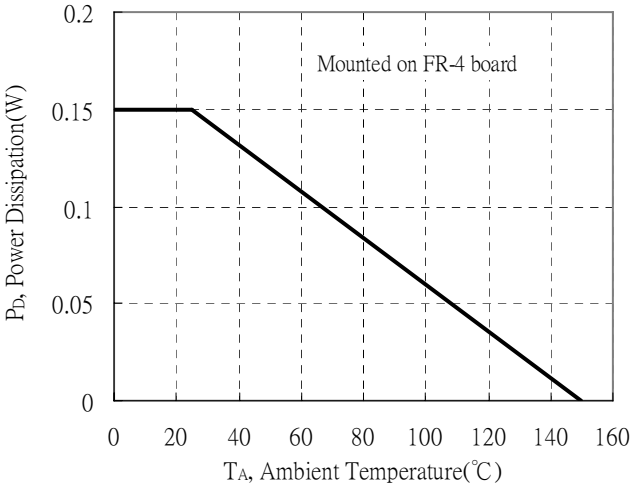


Typical Characteristics(Cont.)

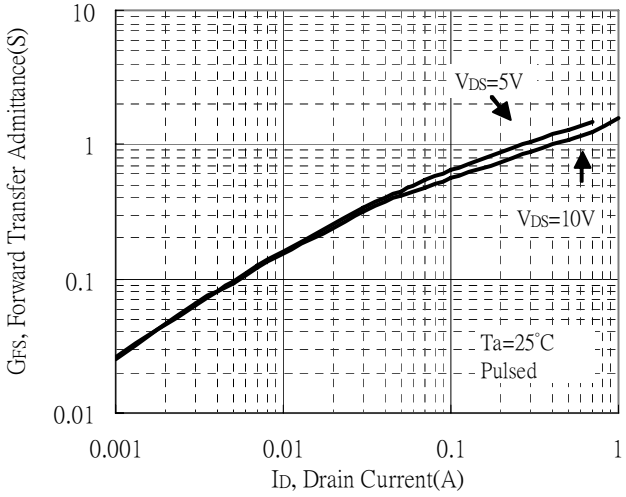
Typical Transfer Characteristics



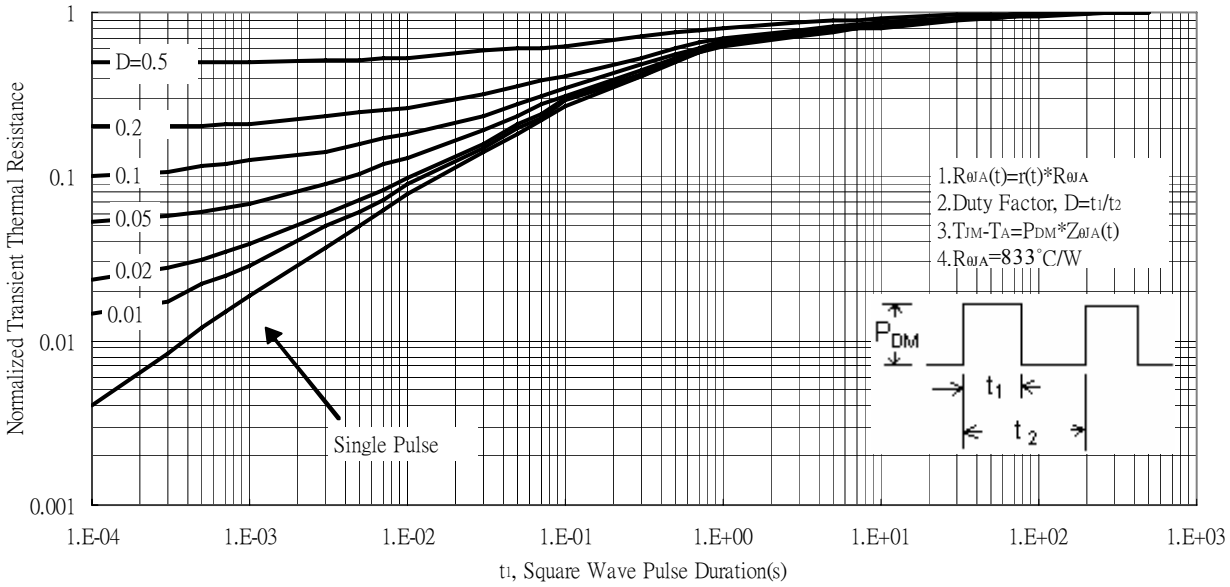
Power Derating Curve



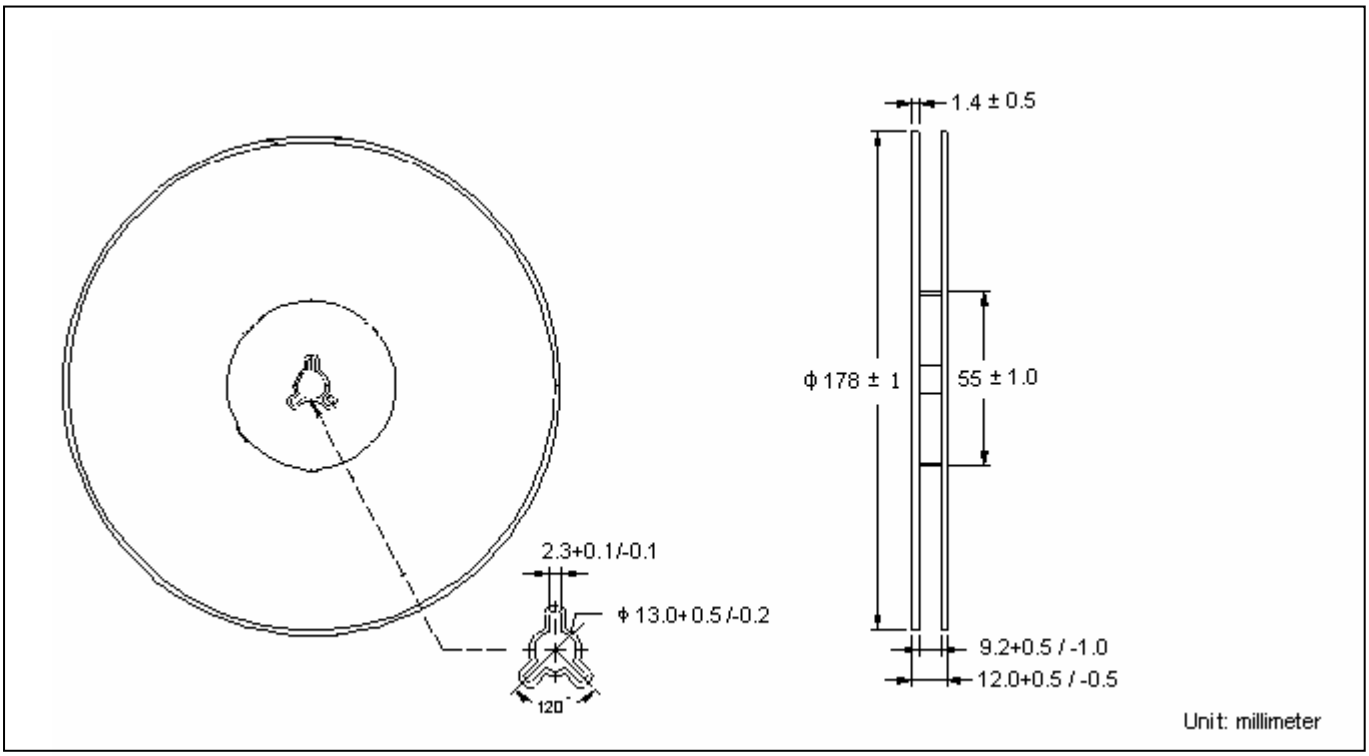
Forward Transfer Admittance vs Drain Current



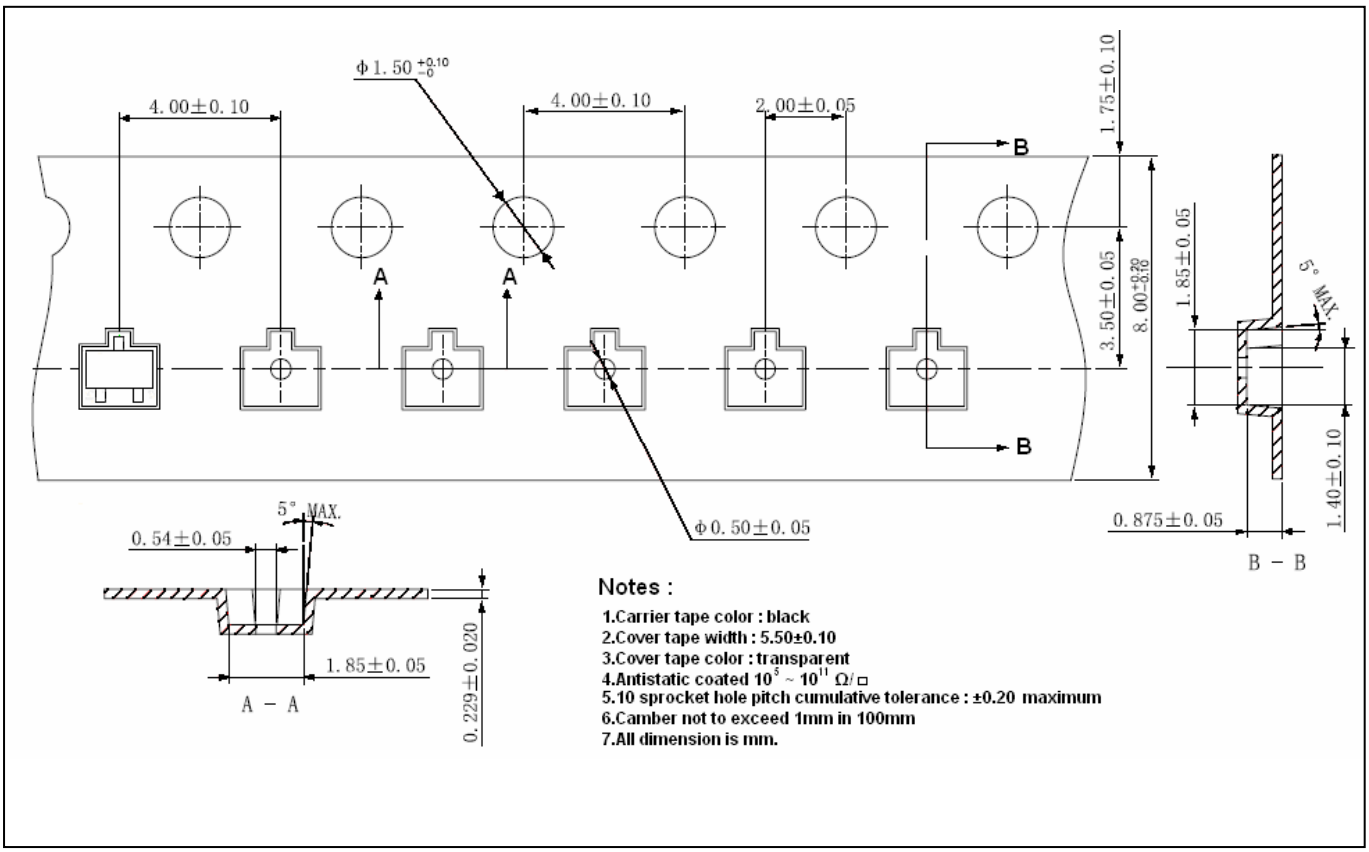
Transient Thermal Response Curves



Reel Dimension



Carrier Tape Dimension



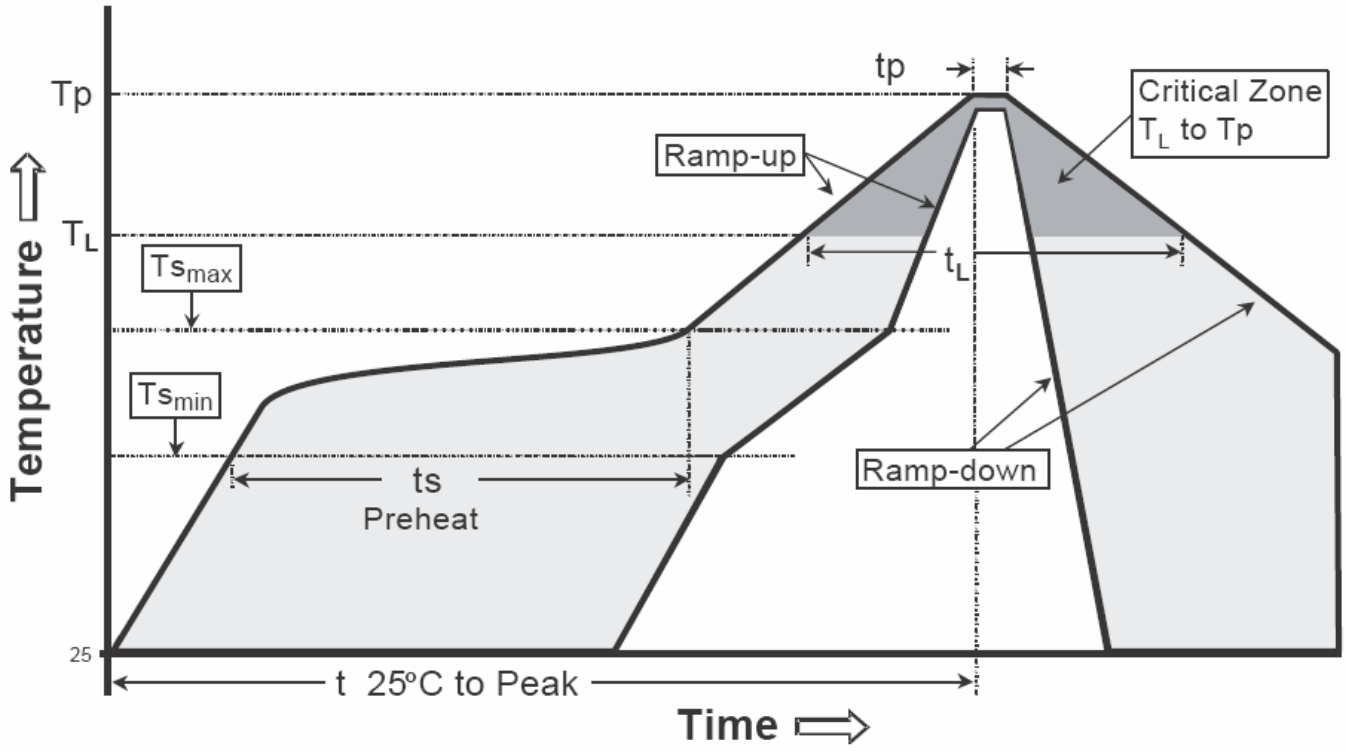
Notes :

1. Carrier tape color : black
2. Cover tape width : 5.50±0.10
3. Cover tape color : transparent
4. Antistatic coated $10^5 \sim 10^{11}$ Ω/□
5. 10 sprocket hole pitch cumulative tolerance : ±0.20 maximum
6. Camber not to exceed 1mm in 100mm
7. All dimension is mm.

Recommended wave soldering condition

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

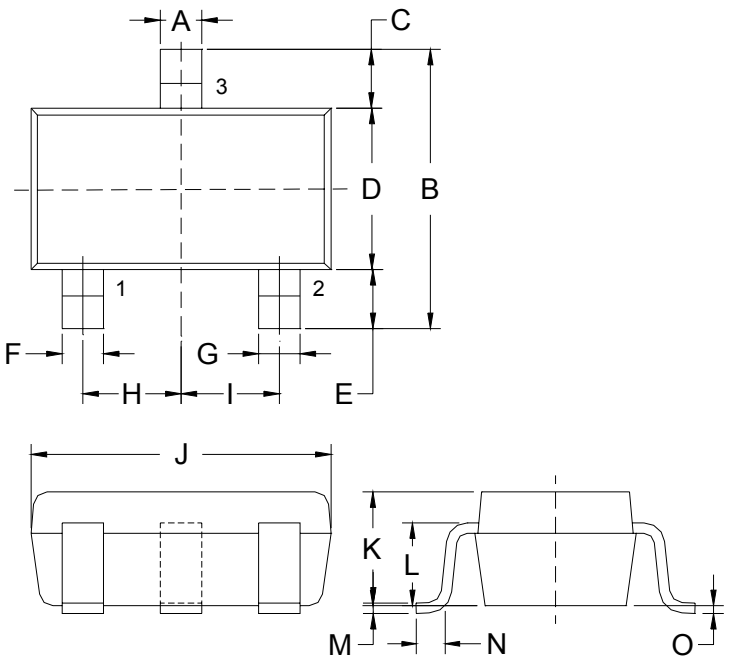
Recommended temperature profile for IR reflow



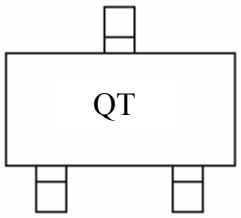
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (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(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-523 Dimension



Marking:



3-Lead SOT-523 Plastic
Surface Mounted Package
CYStek Package Code: C3

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

*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.0079	0.0157	0.20	0.40	I	*0.0197	-	*0.50	-
B	0.0591	0.0669	1.50	1.70	J	0.0610	0.0650	1.55	1.65
C	0.0118	0.0197	0.30	0.50	K	0.0276	0.0315	0.70	0.80
D	0.0295	0.0335	0.75	0.85	L	0.0224	0.0248	0.57	0.63
E	0.0118	0.0197	0.30	0.50	M	0.0020	0.0059	0.05	0.15
F	0.0039	0.0118	0.10	0.30	N	0.0039	0.0118	0.10	0.30
G	0.0039	0.0118	0.10	0.30	O	0	0.0031	0	0.08
H	*0.0197	-	*0.50	-					

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