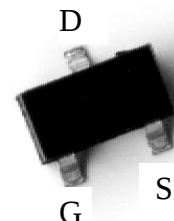


20V N-Channel Enhancement Mode MOSFET

SOT-523

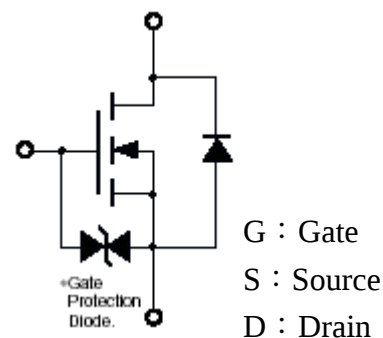


Features:

- Simple drive requirement
- Small package outline
- Pb-free lead plating and halogen-free package

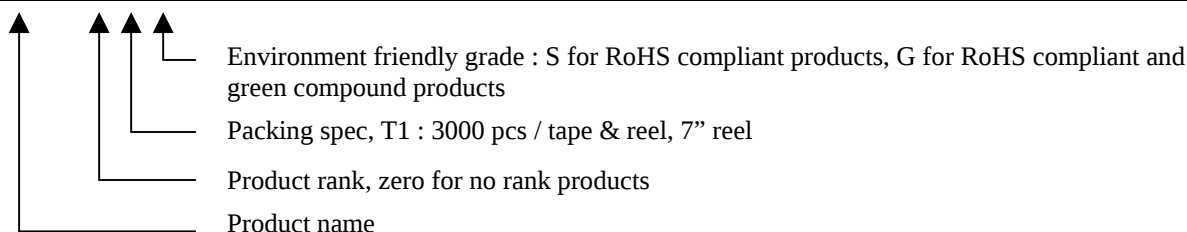
BV_{DSS}	20V
$I_D @ V_{GS}=4V, T_A=25^{\circ}C$	1.4A
$R_{DS(on)} @ V_{GS}=4V, I_D=1A$	63m Ω (typ)
$R_{DS(on)} @ V_{GS}=2.5V, I_D=1A$	83m Ω (typ)
$R_{DS(on)} @ V_{GS}=1.8V, I_D=500mA$	160m Ω (typ)

KWA090N02KC3



Ordering Information

Device	Package	Shipping
KWA090N02KC3-0-T1-G	SOT-523 (Pb-free lead plating package)	3000 pcs / tape & reel



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} =4V	I _D	1.4 (Note 3)	A
Continuous Drain Current @ T _A =70°C, V _{GS} =4V		1.1 (Note 3)	
Pulsed Drain Current (Notes 1, 2)	I _{DM}	6.0	
Power Dissipation	P _D	280 (Note 3)	mW
ESD susceptibility	V _{ESD}	1200 (Note 4)	V
Operating Junction and Storage Temperature	T _j , T _{stg}	-55~+150	°C

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient, max (Note 3)	R _{θja}	450	°C/W
Thermal Resistance, Junction-to-Case, max	R _{θjc}	312	

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

2. Pulse width ≤ 300μs, duty cycle ≤ 2%.

3. Surface mounted on 1 in² copper pad of FR-4 board.

4. Human body model, 1.5kΩ in series with 100pF.

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

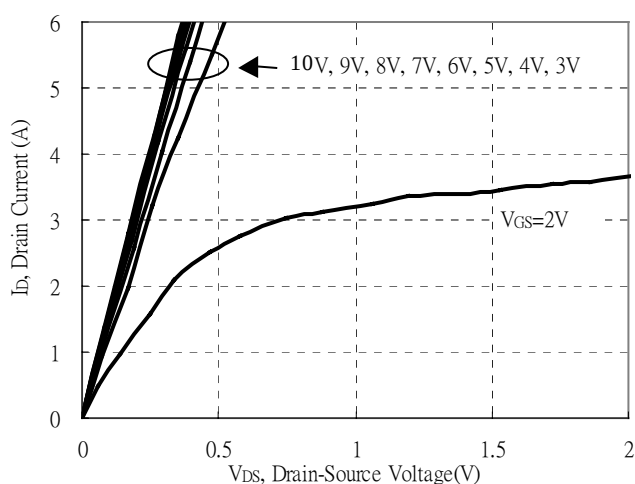
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	20	-	-	V	V _{GS} =0V, I _D =250μA
V _{GS(th)}	0.3	-	1.0		V _{DS} =V _{GS} , I _D =250μA
I _{GSS}	-	-	±10	μA	V _{GS} =±8V, V _{DS} =0V
I _{DSS}	-	-	1		V _{DS} =20V, V _{GS} =0V
	-	-	10		V _{DS} =16V, V _{GS} =0V (T _j =70°C)
*R _{DS(ON)}	-	63	100	mΩ	V _{GS} =4V, I _D =1A
	-	83	120		V _{GS} =2.5V, I _D =1A
	-	160	250		V _{GS} =1.8V, I _D =500mA
*G _{FS}	-	3.8	-	S	V _{DS} =3V, I _D =1A
Dynamic					
C _{iss}	-	159	-	pF	V _{DS} =15V, V _{GS} =0, f=1MHz
C _{oss}	-	26	-		
C _{rss}	-	27	-		
t _{d(ON)}	-	4.4	-	ns	V _{DS} =10V, I _D =200mA, V _{GS} =4.5V, R _G =10Ω
t _r	-	17.8	-		
t _{d(OFF)}	-	14.8	-		
t _f	-	17	-		
Q _g	-	2.6	-	nC	V _{DS} =10V, I _D =200mA, V _{GS} =4.5V
Q _{gs}	-	0.56	-		
Q _{gd}	-	0.4	-		

Source-Drain Diode					
* V_{SD}	-	0.84	1.2	V	$V_{GS}=0V, I_S=1A$
* t_{rr}	-	4.6	-	ns	$I_F=0.2A, dI_F/dt=100A/\mu s$
* Q_{rr}	-	1.0	-	nC	

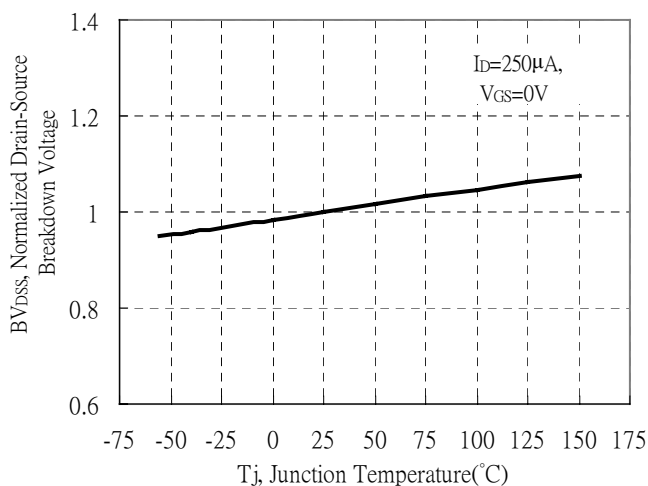
*Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Characteristics

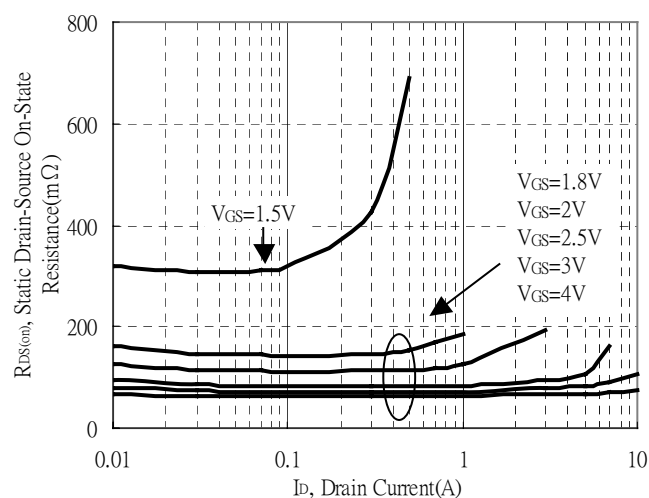
Typical Output Characteristics



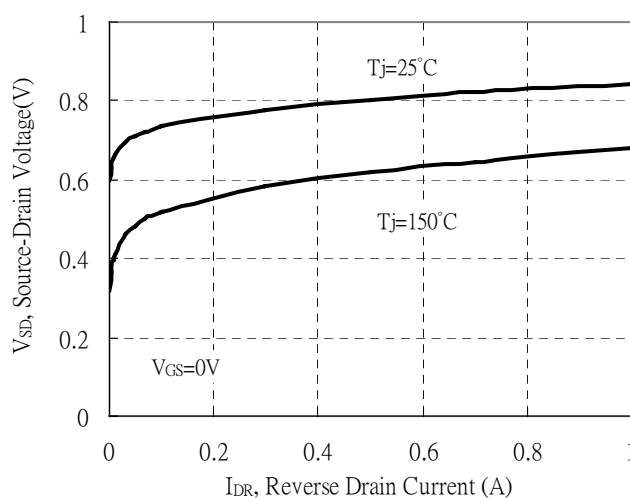
Breakdown Voltage vs Ambient Temperature



Static Drain-Source On-State resistance vs Drain Current

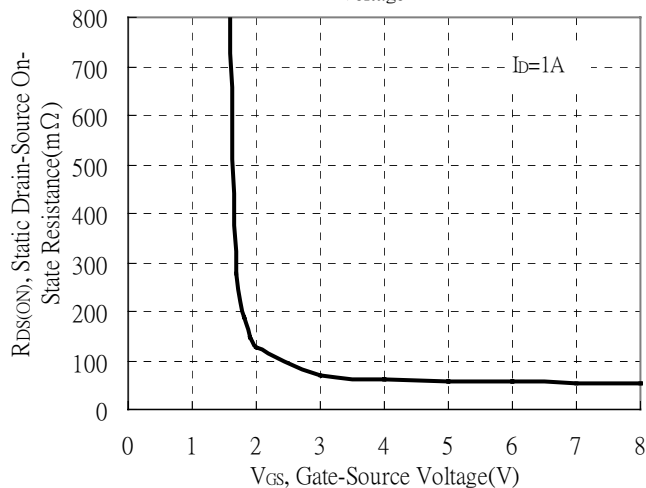


Reverse Drain Current vs Source-Drain Voltage

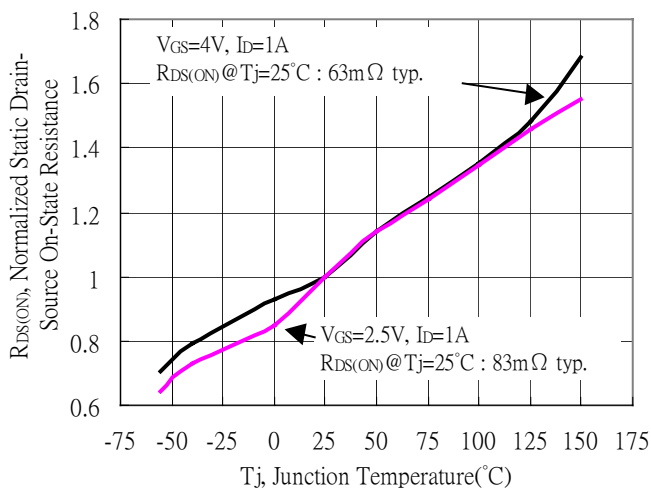


Typical Characteristics(Cont.)

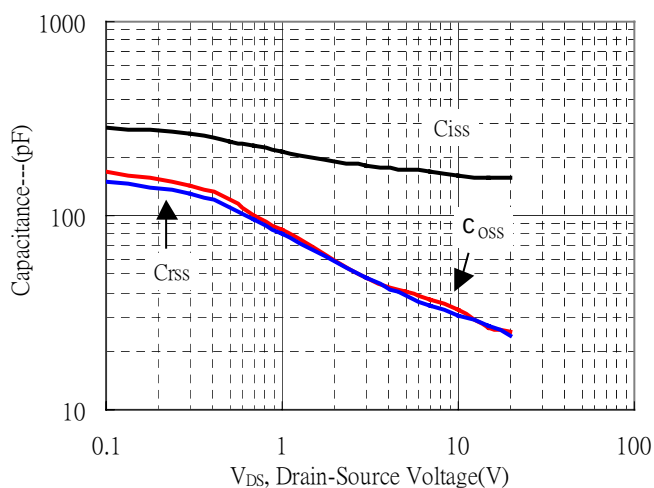
Static Drain-Source On-State Resistance vs Gate-Source Voltage



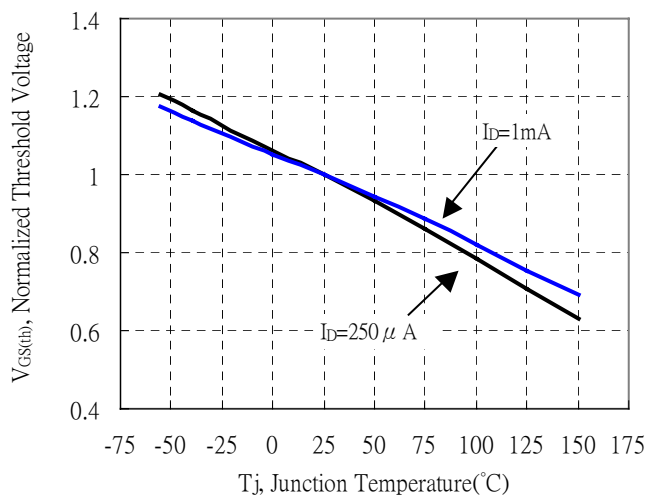
Drain-Source On-State Resistance vs Junction Temperature



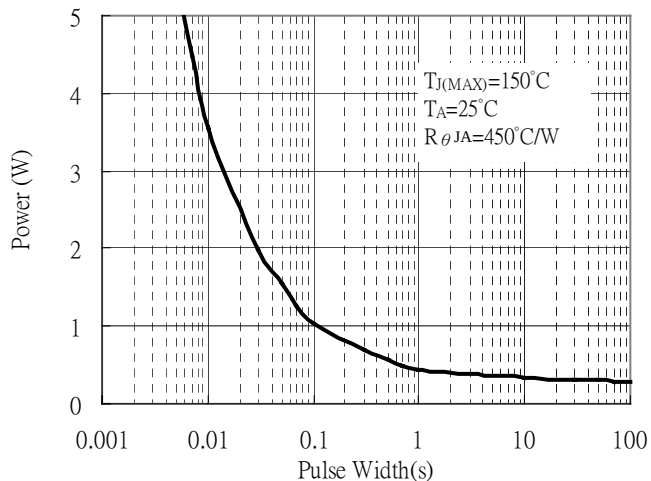
Capacitance vs Drain-to-Source Voltage



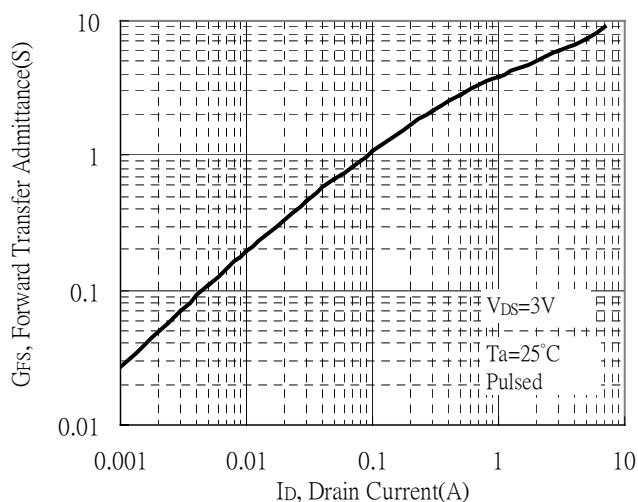
Threshold Voltage vs Junction Temperature



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

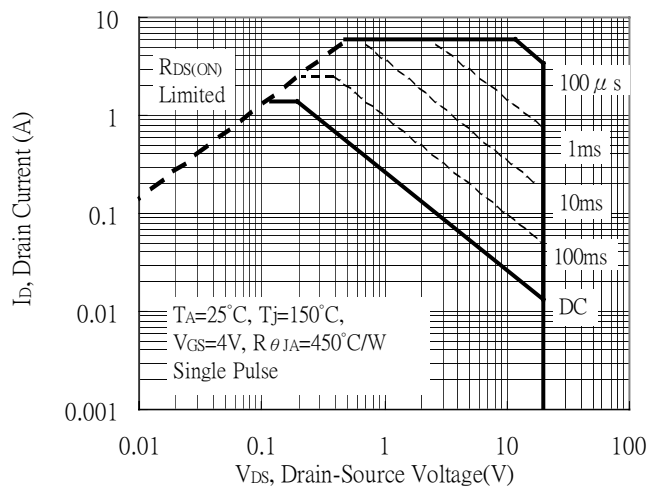


Forward Transfer Admittance vs Drain Current

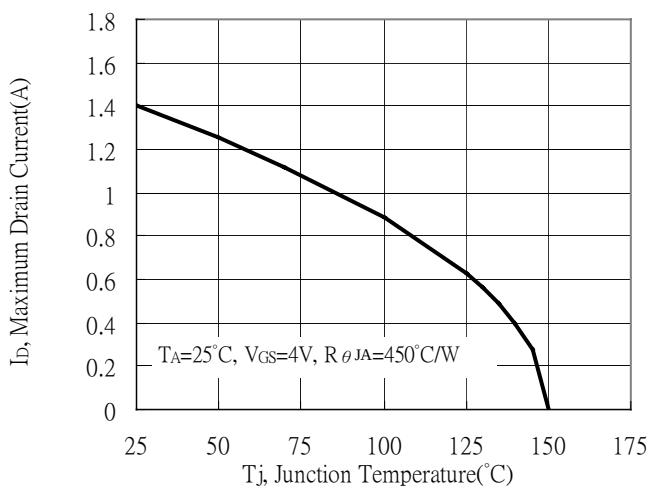


Typical Characteristics(Cont.)

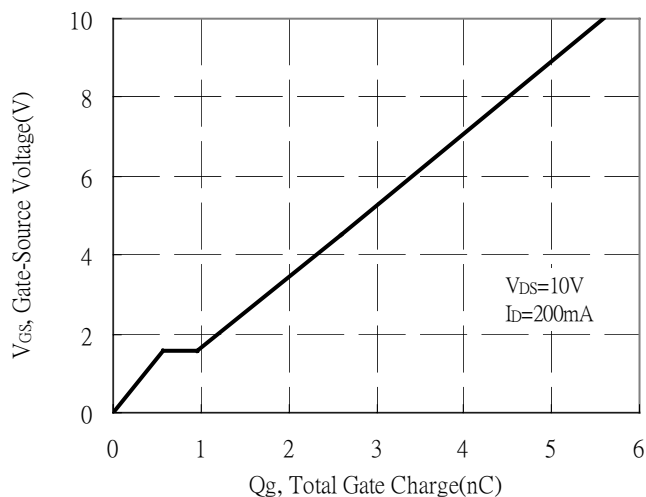
Maximum Safe Operating Area



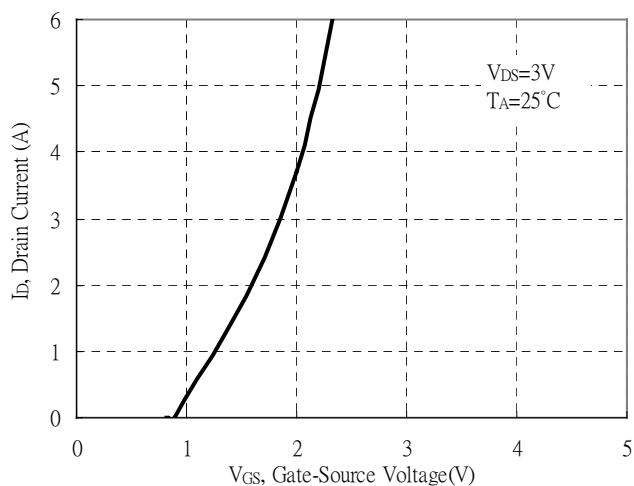
Maximum Drain Current vs Junction Temperature



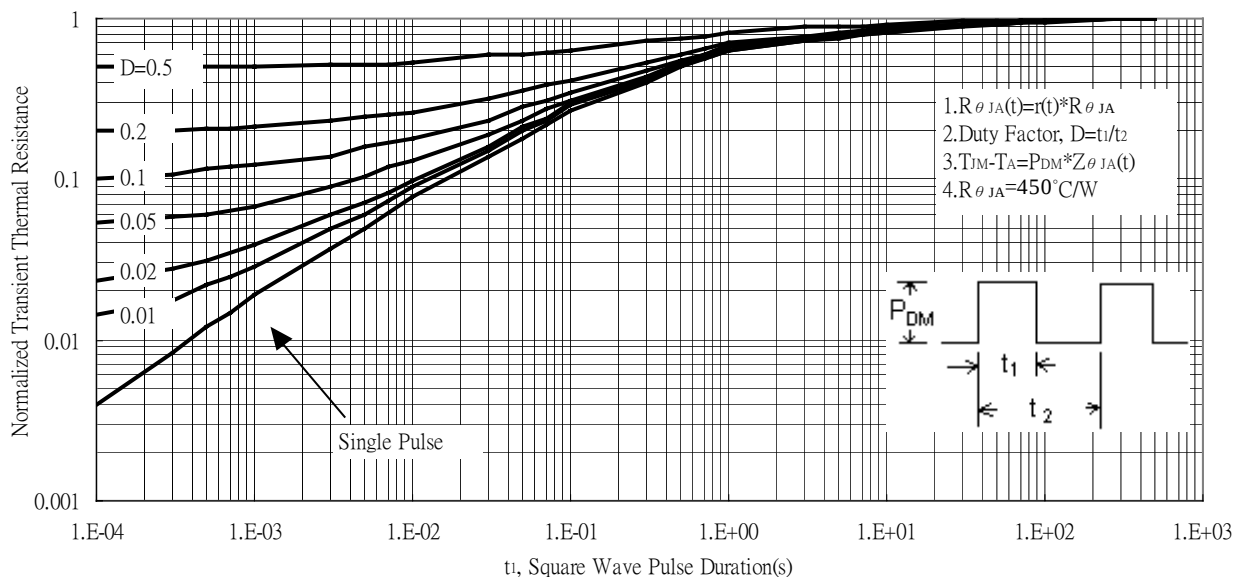
Gate Charge Characteristics



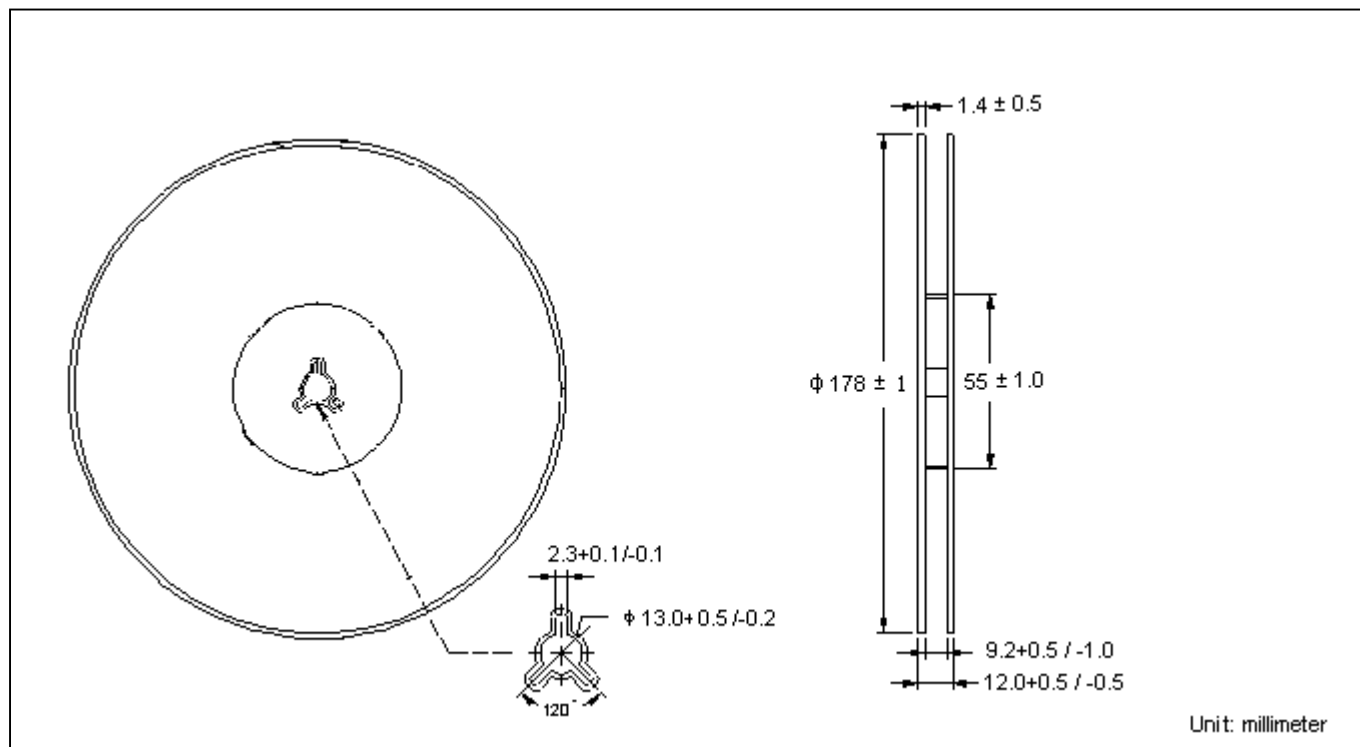
Typical Transfer Characteristics



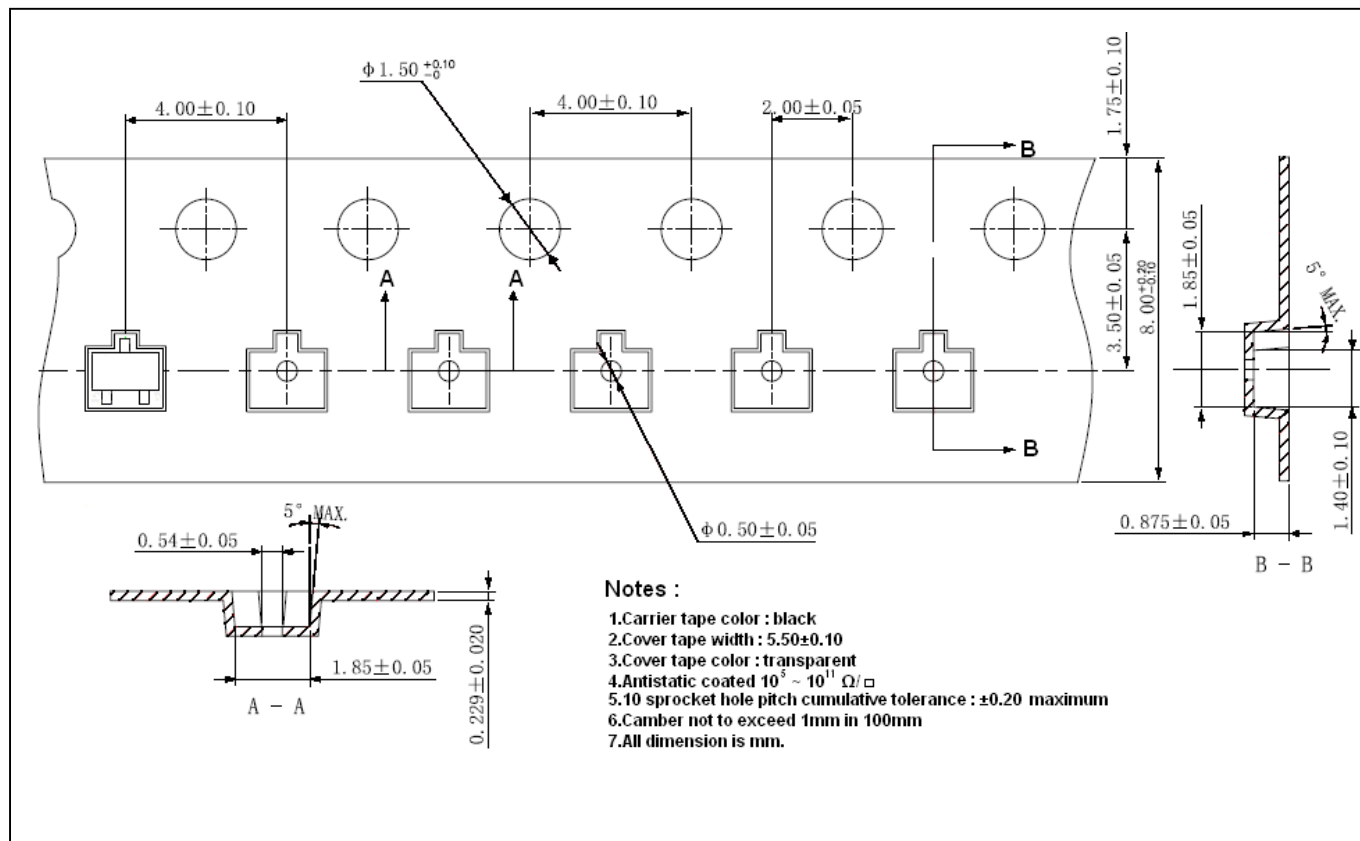
Transient Thermal Response Curves



Reel Dimension



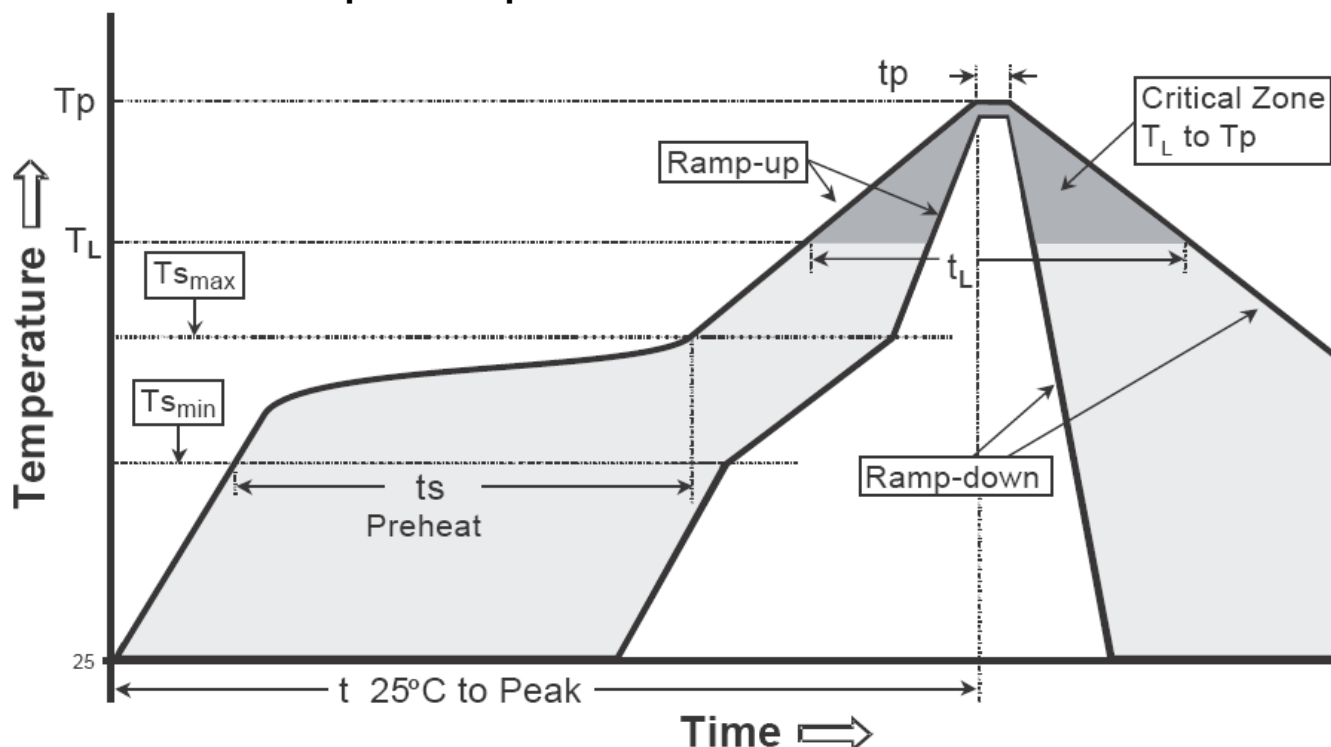
Carrier Tape Dimension



Recommended wave soldering condition

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

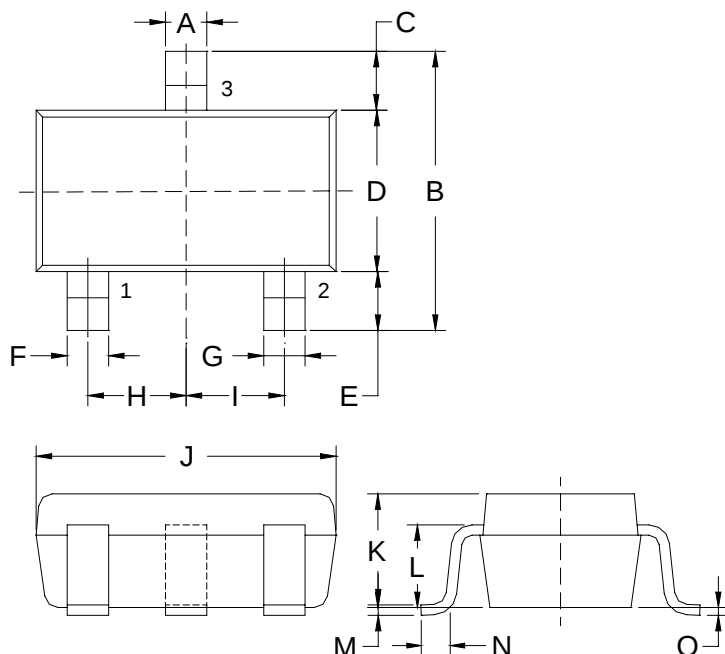
Recommended temperature profile for IR reflow



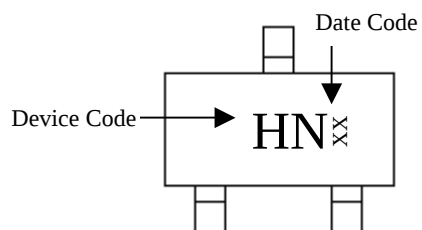
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat -Temperature Min(Ts min) -Temperature Max(Ts max) -Time(ts min to ts max)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: -Temperature (Tl) - Time (tL)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(Tp)	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
 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	-					