

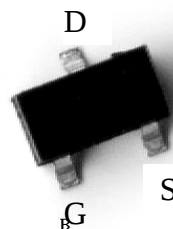
-14V P-Channel Enhancement Mode MOSFET

Outline

SOT-23

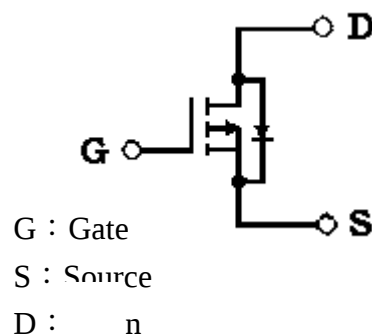
Features:

- Low gate charge
- Compact and low profile SOT-23 package
- Advanced trench process technology
- High density cell design for ultra low on resistance
- Pb-free lead plating package



Symbol

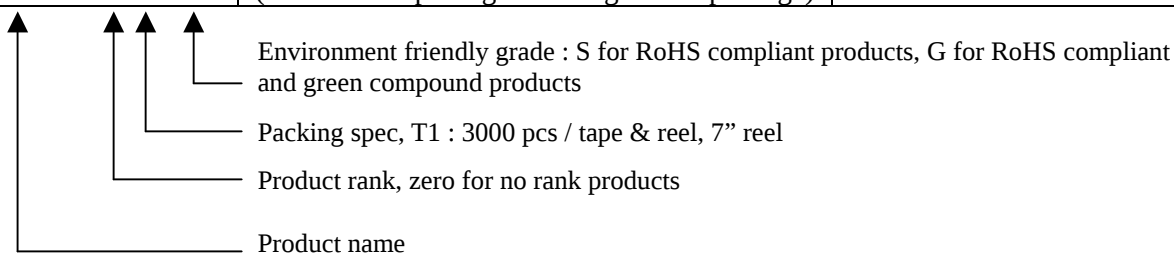
KWA025P01SN3



BV_{DSS}	-14V
$I_D @ V_{GS}=-4.5V, T_A=25^\circ C$	-5.6A
$R_{DS(on)} @ V_{GS}=-4.5V, I_D=-4A$	25.5m Ω (typ)
$R_{DS(on)} @ V_{GS}=-2.5V, I_D=-4A$	35.5m Ω (typ)
$R_{DS(on)} @ V_{GS}=-1.8V, I_D=-2A$	52.0m Ω (typ)

Ordering Information

Device	Package	Shipping
KWA025P01SN3-0-T1-G	SOT-23 (Pb-free lead plating and halogen-free package)	3000 pcs / tape & reel



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V _{DS}	-14	V
Gate-Source Voltage	V _{GS}	±12	
Continuous Drain Current @ TA=25°C, V _{GS} =-10V (Note 3)	I _D	-5.6	A
Continuous Drain Current @ TA=70°C, V _{GS} =-10V (Note 3)		-4.5	
Pulsed Drain Current (Notes 1, 2)	I _{DM}	-35	
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 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; 270°C/W when mounted on minimum copper pad

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient(PCB mounted)	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

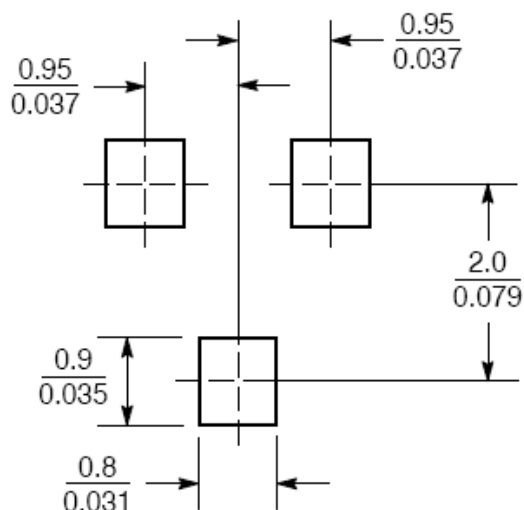
Electrical Characteristics (T_j=25°C, unless otherwise noted)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	-14	-	-	V	V _{GS} =0V, I _D =-250μA
ΔBV _{DSS} /ΔT _j	-	2	-	mV/°C	Reference to 25°C, I _D =-250μA
V _{GS(th)}	-0.4	-	-1.0	V	V _{DS} =V _{GS} , I _D =-250μA
I _{GSS}	-	-	±10	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	-1	μA	V _{DS} =-12V, V _{GS} =0V
	-	-	-10		V _{DS} =-12V, V _{GS} =0V (T _j =70°C)
*R _{DS(ON)}	-	25.5	34	mΩ	V _{GS} =-4.5V, I _D =-4A
	-	35.5	48		V _{GS} =-2.5V, I _D =-4A
	-	52.0	69		V _{GS} =-1.8V, I _D =-2A
*G _{FS}	-	7.6	-	S	V _{DS} =-10V, I _D =-3A
Dynamic					
C _{iss}	-	1087	-	pF	V _{DS} =-10V, V _{GS} =0V, f=1MHz
C _{oss}	-	275	-		
C _{rss}	-	247	-		
t _{d(ON)}	-	15	-	ns	V _{DS} =-10V, I _D =-1A, V _{GS} =-4.5V R _G =6Ω
t _r	-	23.6	-		
t _{d(OFF)}	-	100.8	-		
t _f	-	69.6	-		

Qg	-	14.6	-	nC	V _{DS} =-10V, I _D =-4A, V _{GS} =-4.5V
Qgs	-	2.1	-		
Qgd	-	4.8	-		
Source-Drain Diode					
*V _{SD}	-	-0.78	-1	V	V _{GS} =0V, I _S =-1A
T _{rr}	-	80	-	ns	V _{GS} =0V, I _F =-4A, dI _F /dt=100A/μs
Q _{rr}	-	68	-	nC	

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

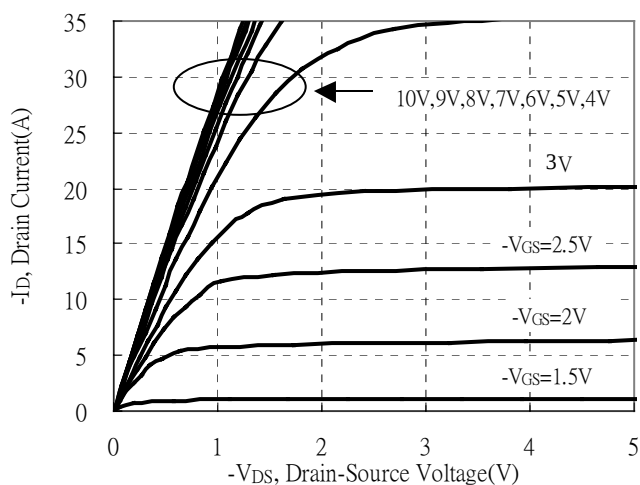
Recommended Soldering Footprint



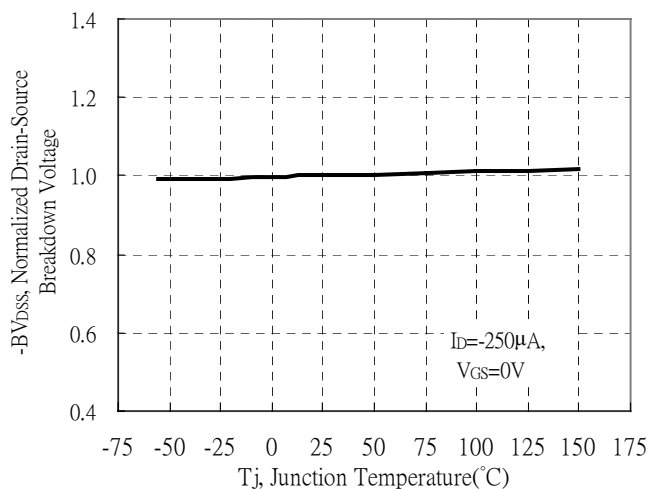
Unit : $\frac{mm}{inches}$

Typical Characteristics

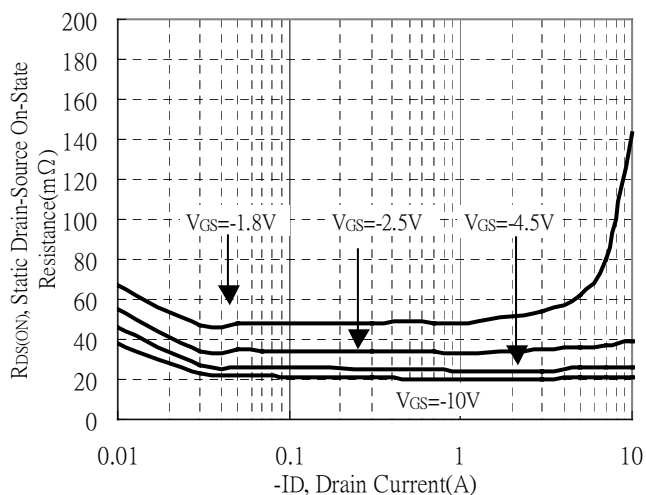
Typical Output Characteristics



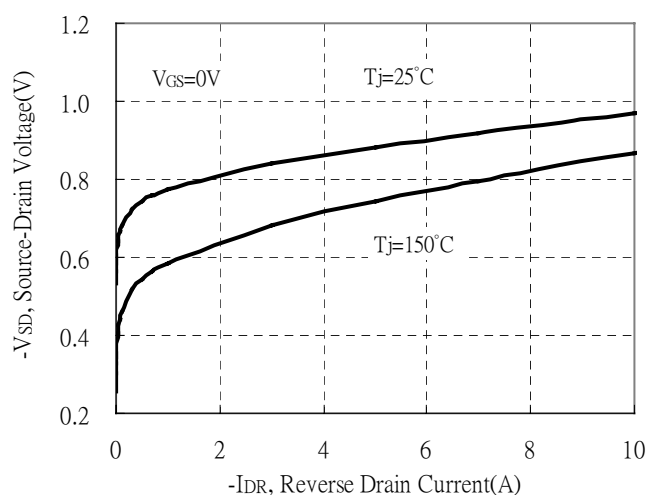
Breakdown Voltage vs Ambient Temperature



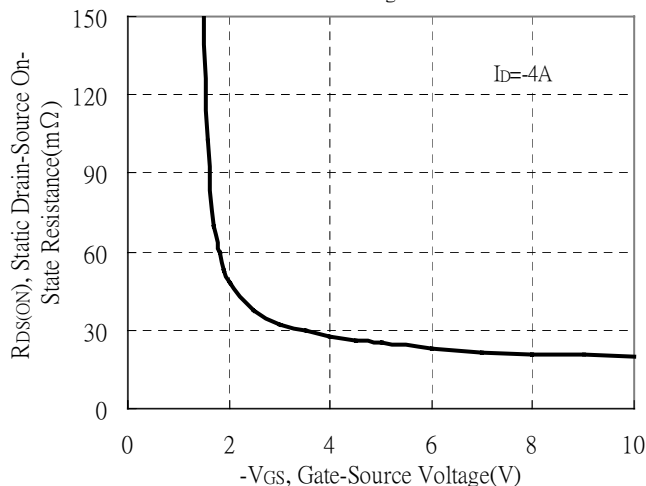
Static Drain-Source On-State resistance vs Drain Current



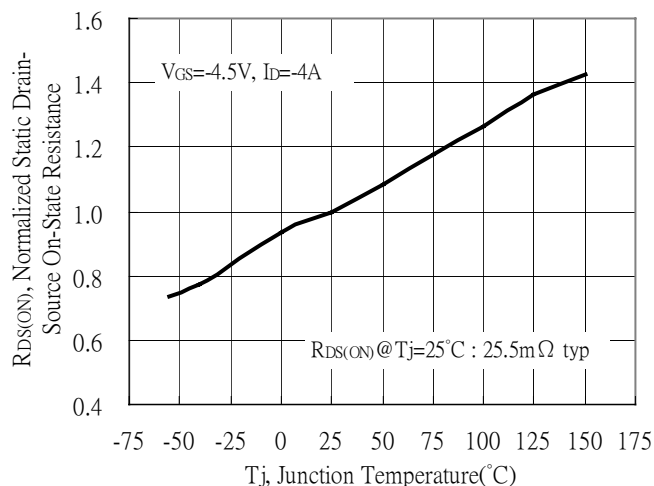
Reverse Drain Current vs Source-Drain Voltage



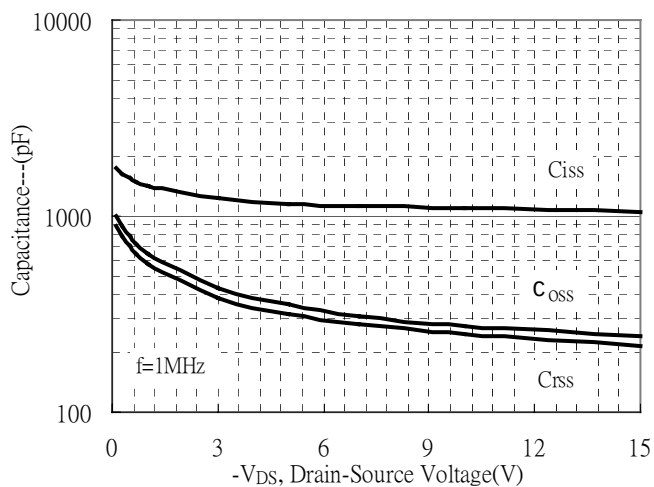
Static Drain-Source On-State Resistance vs Gate-Source Voltage



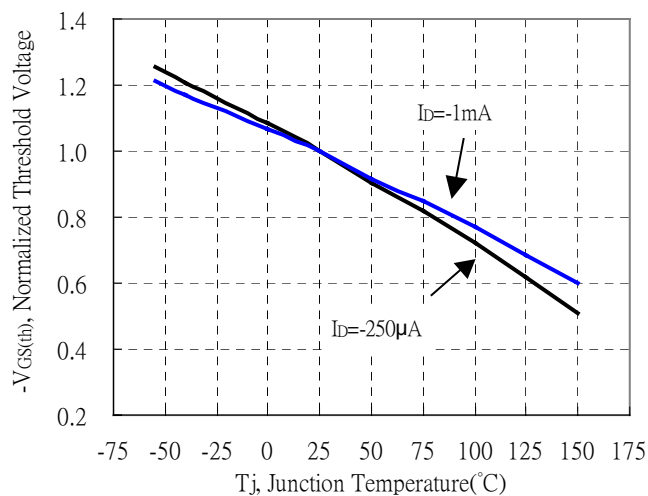
Drain-Source On-State Resistance vs Junction Temperature



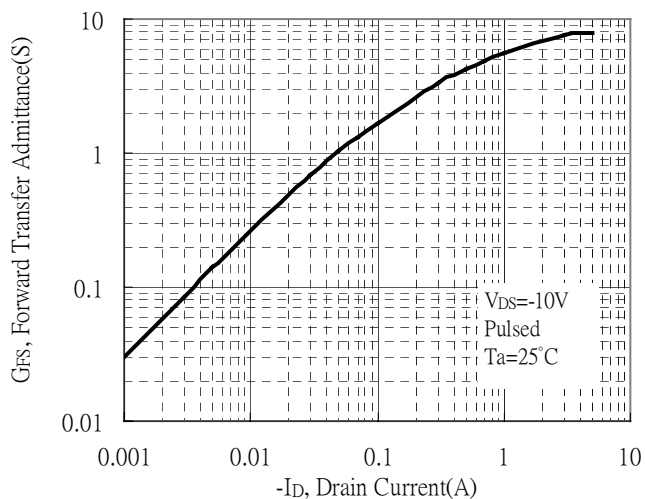
Capacitance vs Drain-to-Source Voltage



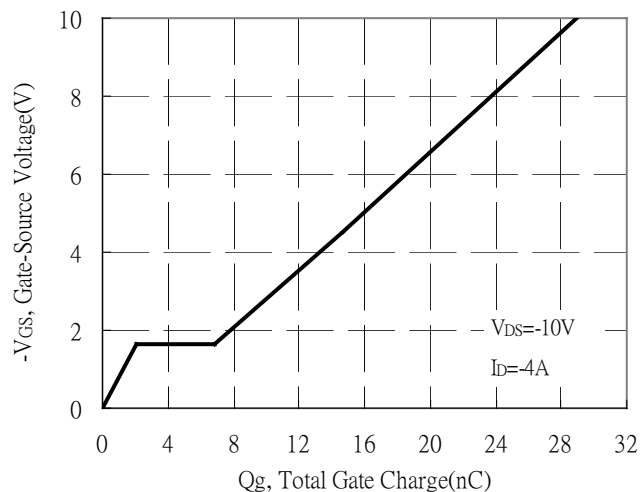
Threshold Voltage vs Junction Temperature



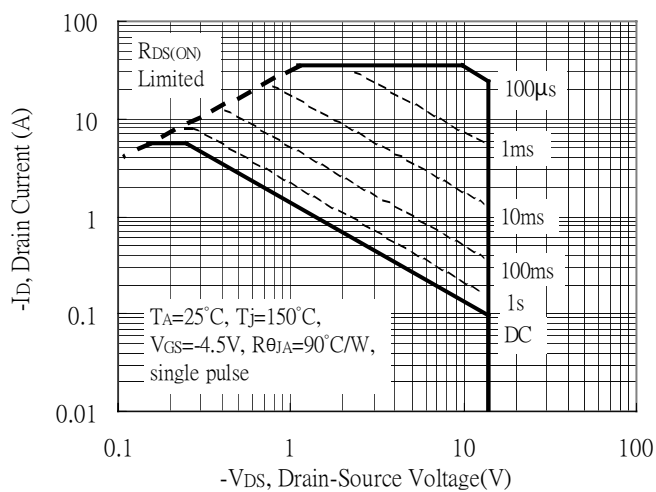
Forward Transfer Admittance vs Drain Current



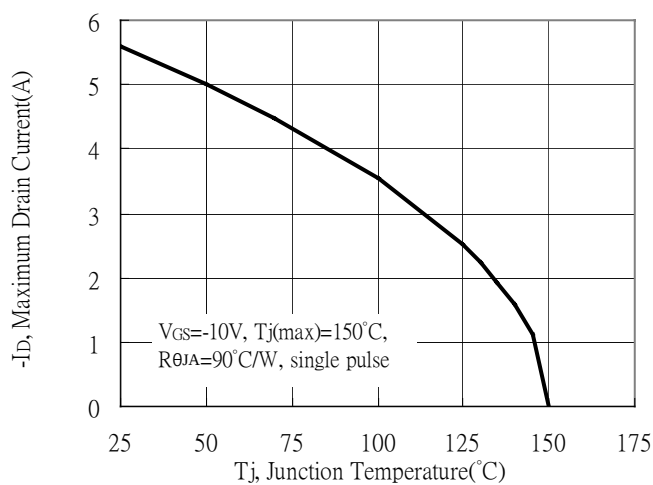
Gate Charge Characteristics



Maximum Safe Operating Area

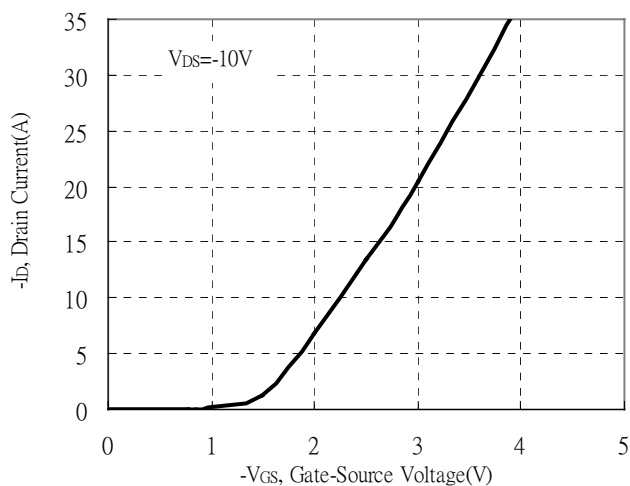


Maximum Drain Current vs Junction Temperature

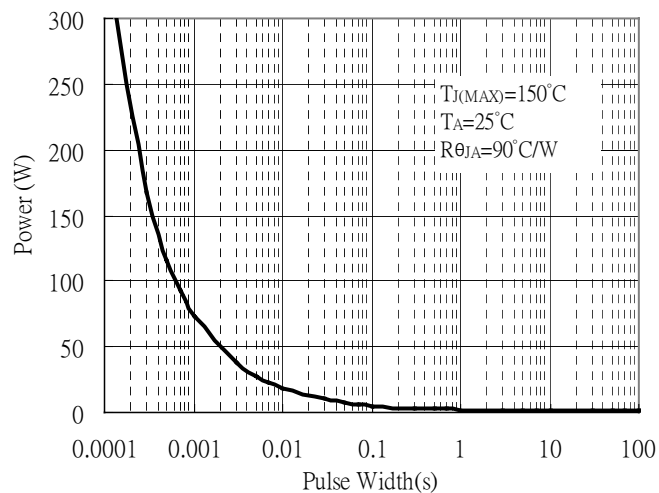


Typical Characteristics(Cont.)

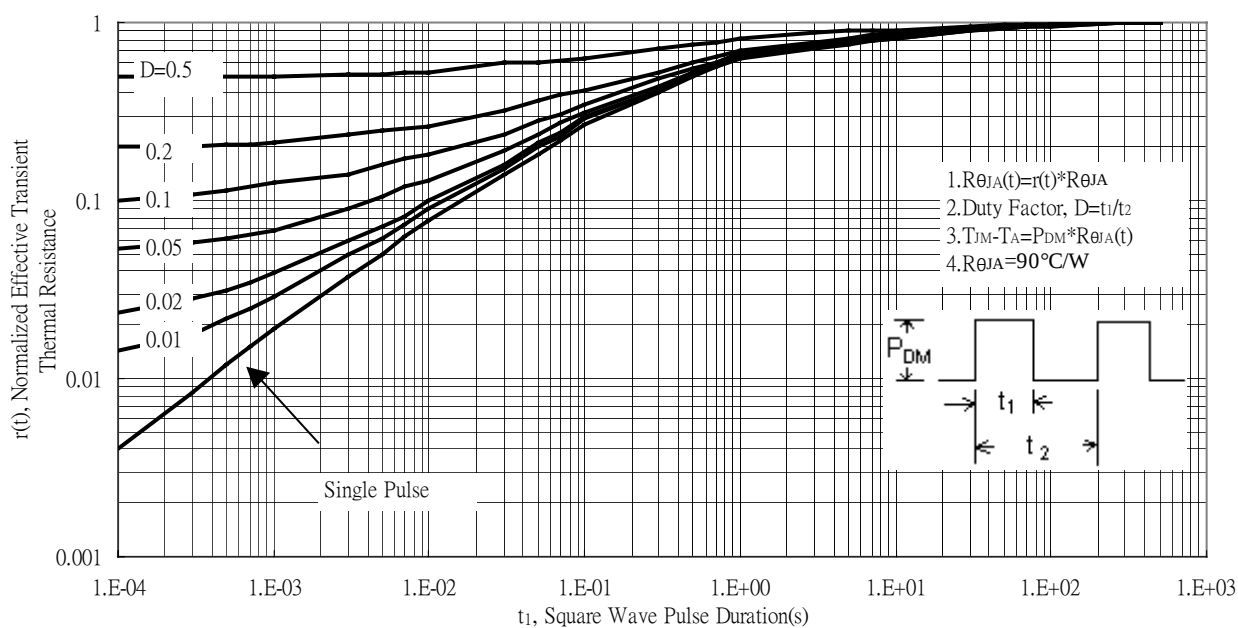
Typical Transfer Characteristics



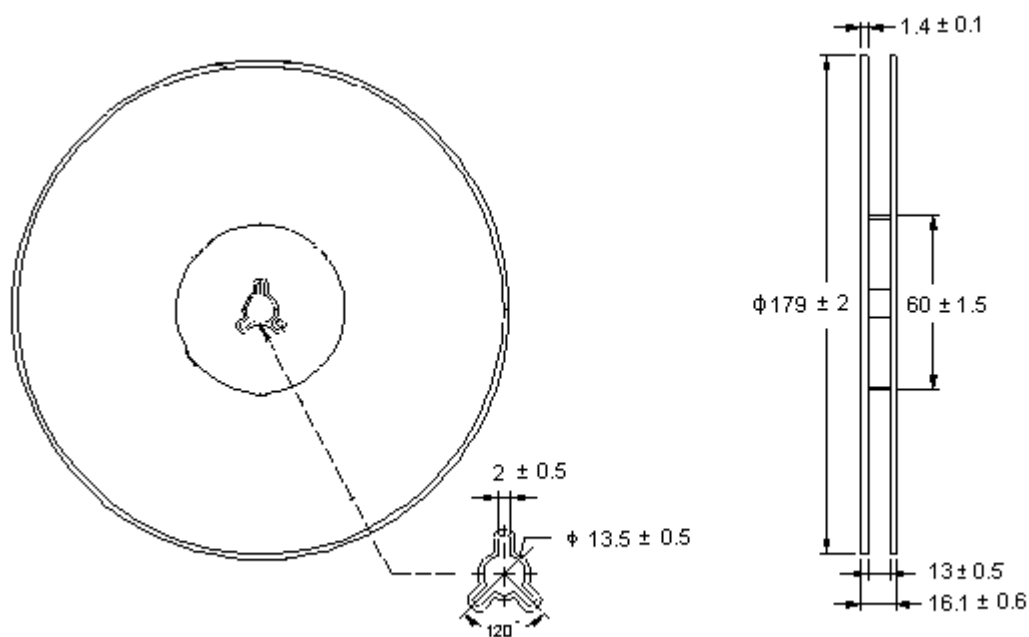
Single Pulse Power Rating, Junction to Case



Transient Thermal Response Curves

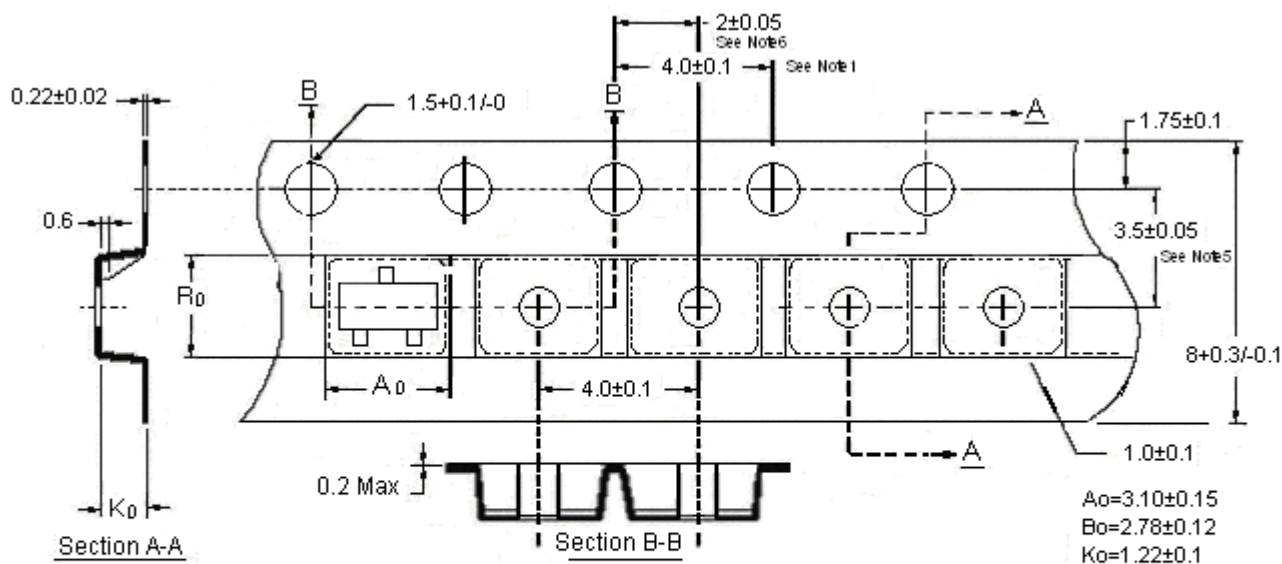


Reel Dimension



Unit: millimeter

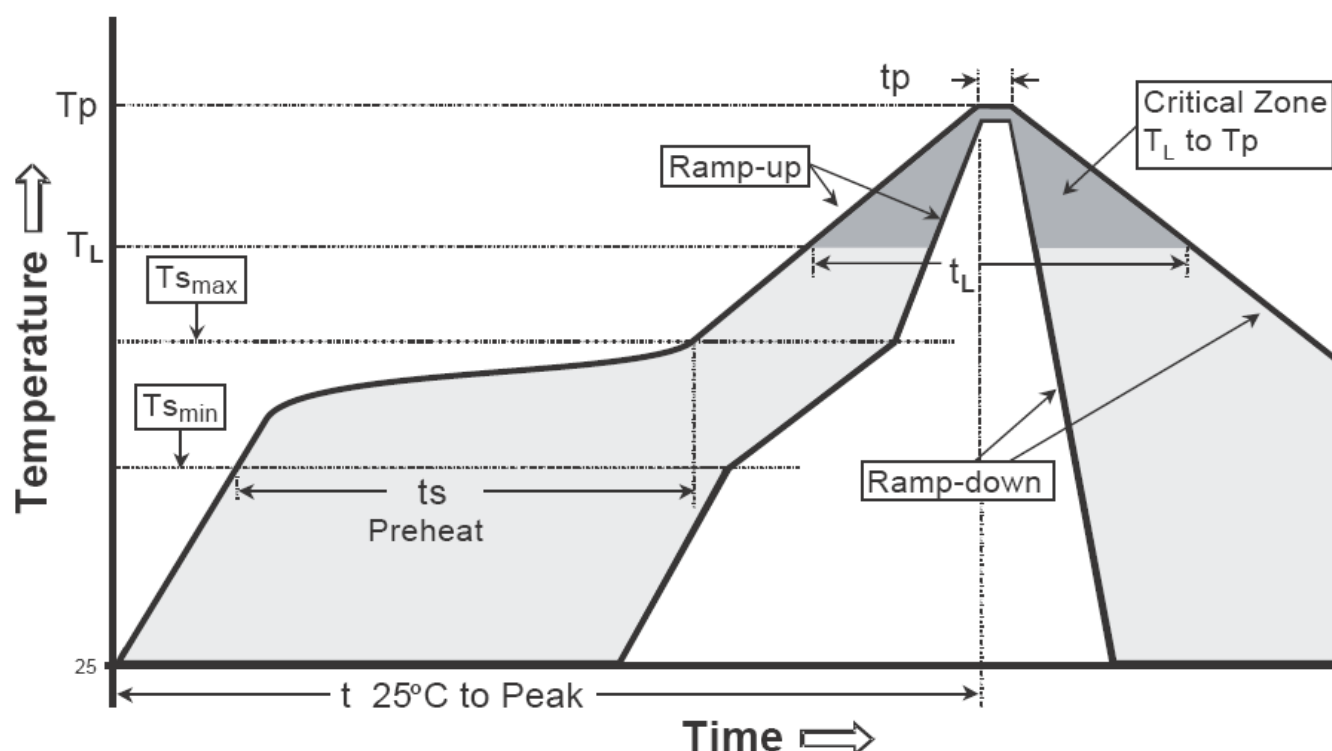
Carrier Tape Dimension



Recommended wave soldering condition

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

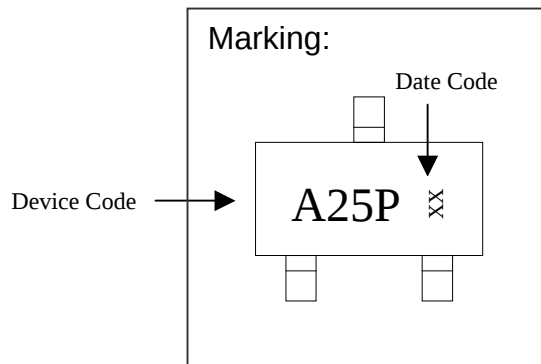
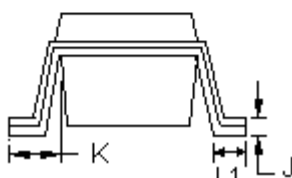
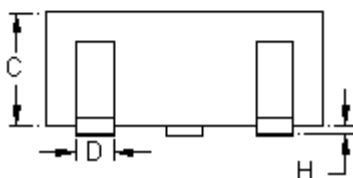
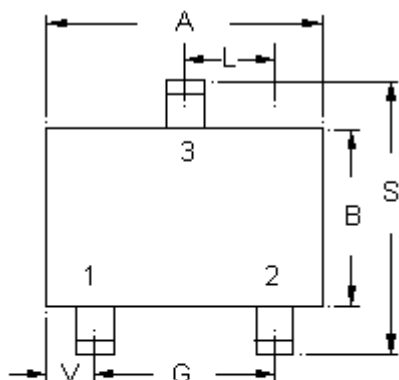
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Ts max to Tp)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (TL)	183°C	217°C
- Time (tL)	60-150 seconds	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-23 Dimension



3-Lead SOT-23 Plastic
 Surface Mounted Package
 Code: N3

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

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1102	0.1204	2.80	3.04	J	0.0032	0.0079	0.08	0.20
B	0.0472	0.0669	1.20	1.70	K	0.0118	0.0266	0.30	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	0.1161	2.10	2.95
G	0.0669	0.0910	1.70	2.30	V	0.0098	0.0256	0.25	0.65
H	0.0000	0.0040	0.00	0.10	L1	0.0118	0.0197	0.30	0.50