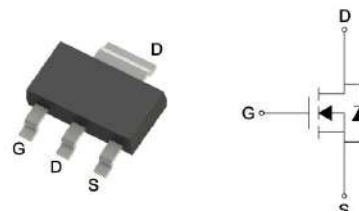


N-Channel Enhancement Mode Power MOSFET

Features

- Low On Resistance
- Low Gate Charge
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free

SOT-223



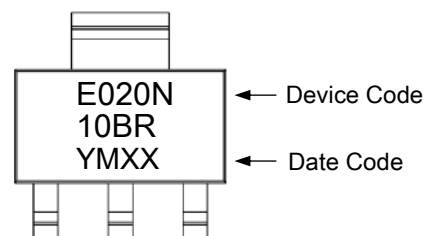
Product Summary

BV_{DSS}	100	V
$R_{DS(ON)}$ typ. @ $V_{GS}=10V$, $I_D=5A$	28	m Ω
I_D @ $V_{GS}=10V$, $T_C=25^\circ C$	7	A
I_D @ $V_{GS}=10V$, $T_A=25^\circ C$	5	

Ordering Information

Device	Package	Shipping
KLE020N10BR	SOT-223	2500pcs / Tape & Reel

Marking



YMXX: Date Code Marking

Y: Year Code, the last digit of Christian year

M: Month Code

A: Jan	B: Feb	C: Mar	D: Apr	E: May	F: Jun
G: Jul	H: Aug	J: Sep	K: Oct	L: Nov	M: Dec

XX: Production Serial Number, 01~99

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current @ $V_{GS}=10V$, $T_C=25^\circ C$ (silicon limit)	I_D	15	A
Continuous Drain Current @ $V_{GS}=10V$, $T_C=25^\circ C$ (package limit)		7	
Continuous Drain Current @ $V_{GS}=10V$, $T_C=100^\circ C$		7	
Continuous Drain Current @ $V_{GS}=10V$, $T_A=25^\circ C$		5	
Continuous Drain Current @ $V_{GS}=10V$, $T_A=70^\circ C$		4	
Pulsed Drain Current	I_{DM}	28	A
Continuous Body Diode Forward Current @ $T_C=25^\circ C$	I_S	7	
Pulsed Body Diode Forward Current @ $T_C=25^\circ C$	I_{SM}	28	
Avalanche Current @ $L=0.1mH$	I_{AS}	15	
Avalanche Energy @ $L=0.5mH$	E_{AS}	16	mJ
Total Power Dissipation	$T_C=25^\circ C$	17	W
	$T_C=100^\circ C$	6.8	
	$T_A=25^\circ C$	2	
	$T_A=70^\circ C$	1.3	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	$^\circ C$
Steady State Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	7.2	$^\circ C/W$
Steady State Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	63	

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

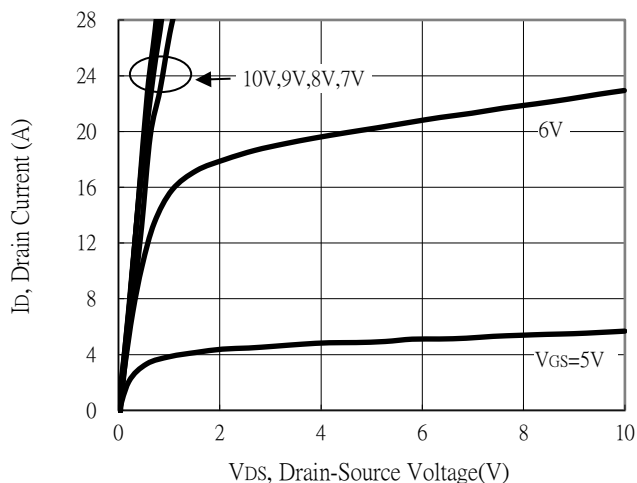
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	100	-	-	V	V _{GS} =0V, I _D =250μA
V _{GS(th)}	2	-	4		V _{DS} =V _{GS} , I _D =250μA
G _{FS}	-	5.2	-	S	V _{DS} =10V, I _D =5A
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =80V, V _{GS} =0V
R _{DS(ON)}	-	28	37	mΩ	V _{GS} =10V, I _D =5A
Dynamic					
C _{iss}	-	830	-	pF	V _{DS} =50V, V _{GS} =0V, f=1MHz
C _{oss}	-	108	-		
C _{rss}	-	16	-		
R _g	-	1.3	-	Ω	f=1MHz
Q _g *d,e	-	13	-	nC	V _{DS} =50V, I _D =5A, V _{GS} =10V
Q _{gs} *d,e	-	6	-		
Q _{gd} *d,e	-	2.9	-		
t _{d(ON)} *d,e	-	14	-	ns	V _{DS} =50V, I _D =5A, V _{GS} =10V, R _{GS} =3Ω
t _r *d,e	-	15	-		
t _{d(OFF)} *d,e	-	17	-		
t _f *d,e	-	5.9	-		
Source-Drain Diode					
V _{SD} *d	-	0.82	1.2	V	I _S =5A, V _{GS} =0V
t _{rr}	-	32	-	ns	I _F =5A, di/dt=100A/μs
Q _{rr}	-	48	-	nC	

Note:

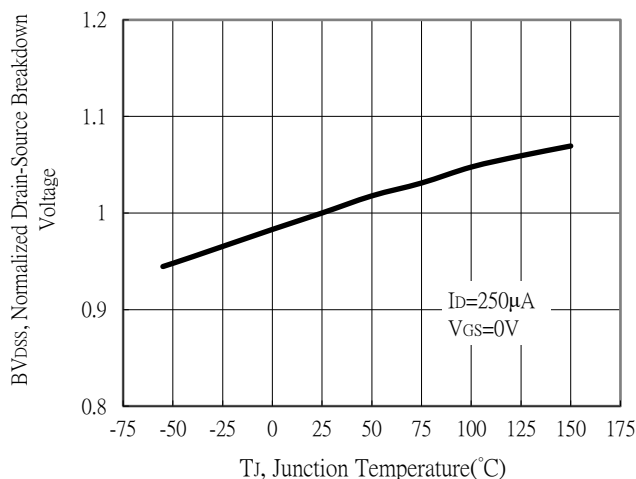
- *a. The power dissipation P_D is based on T_{J(MAX)}=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper Dissipation.
- *b. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz copper, in a still air environment with T_A=25°C. The power dissipation P_D is based on R_{θJA} and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
- *c. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.
- *d. Pulse Test : Pulse Width≤300μs, Duty Cycle≤2%.
- *e. Independent of operating temperature.

Typical Characteristics

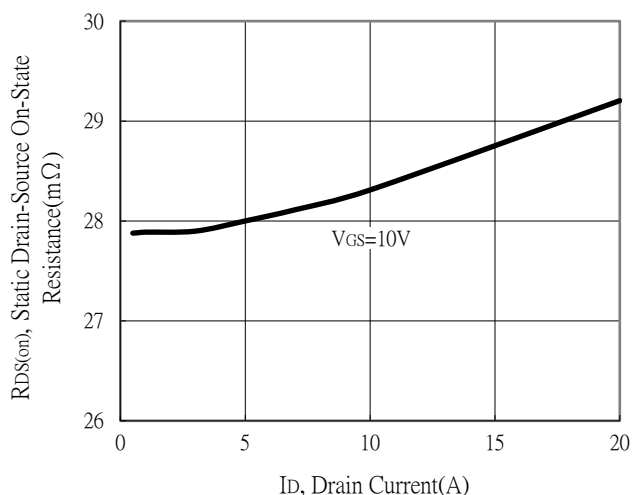
Typical Output Characteristics



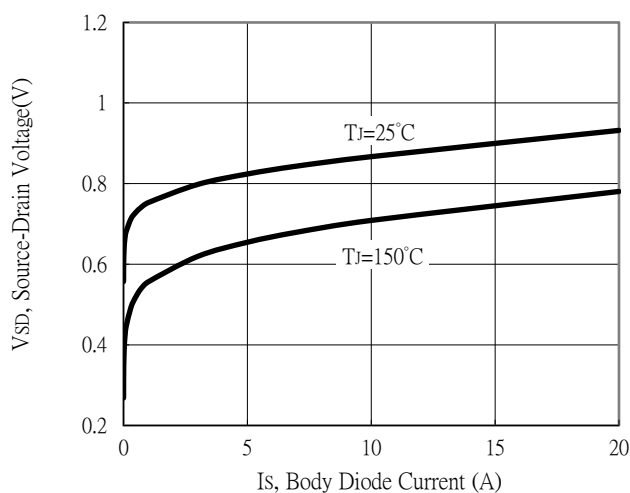
Breakdown Voltage vs Ambient Temperature



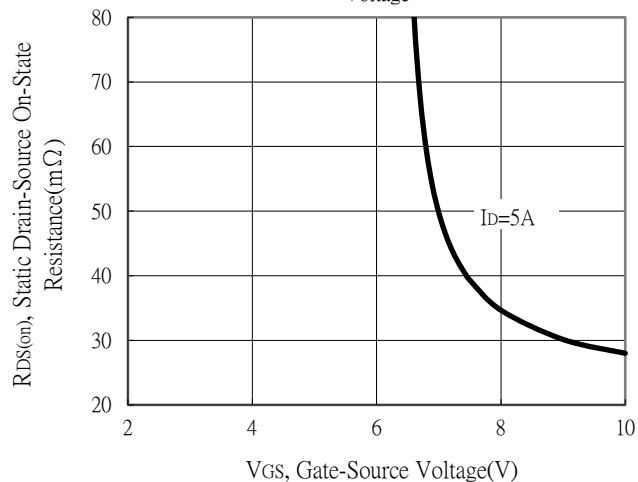
Static Drain-Source On-State resistance vs Drain Current



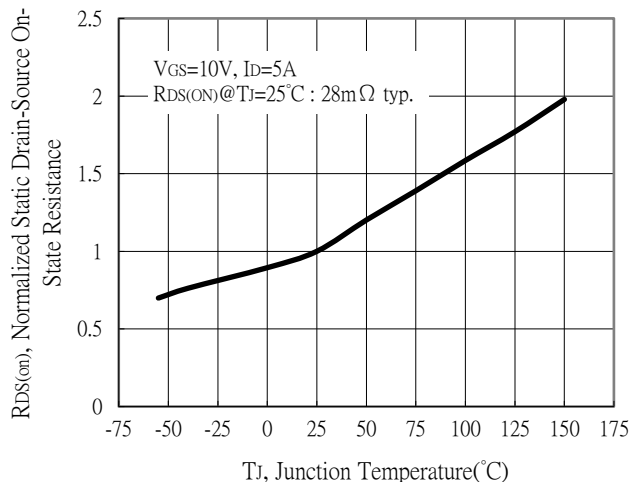
Body Diode Current vs Source-Drain Voltage



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

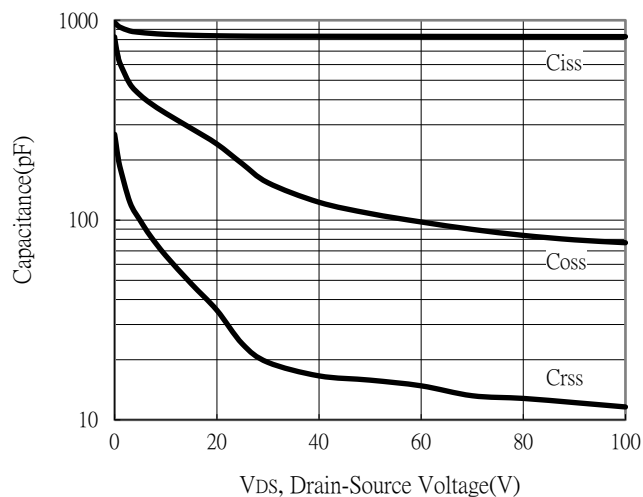


Drain-Source On-State Resistance vs Junction Temperature

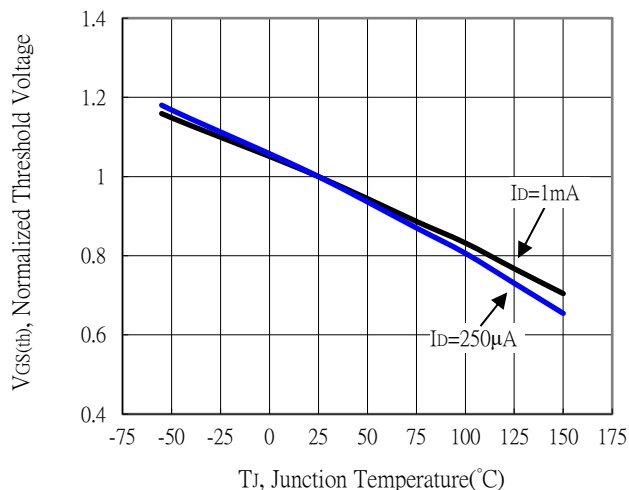


Typical Characteristics

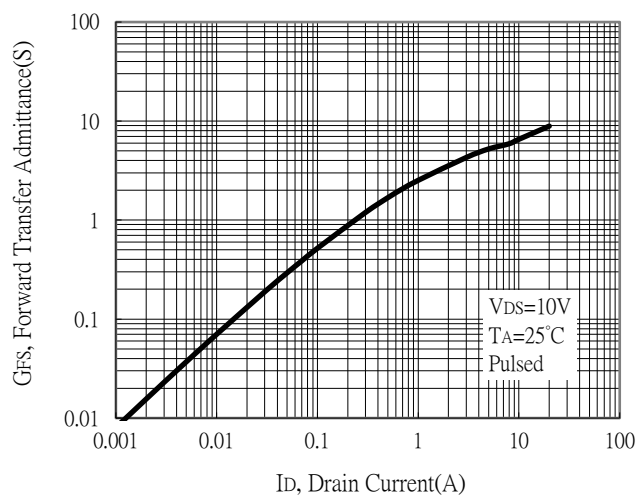
Capacitance vs Drain-to-Source Voltage



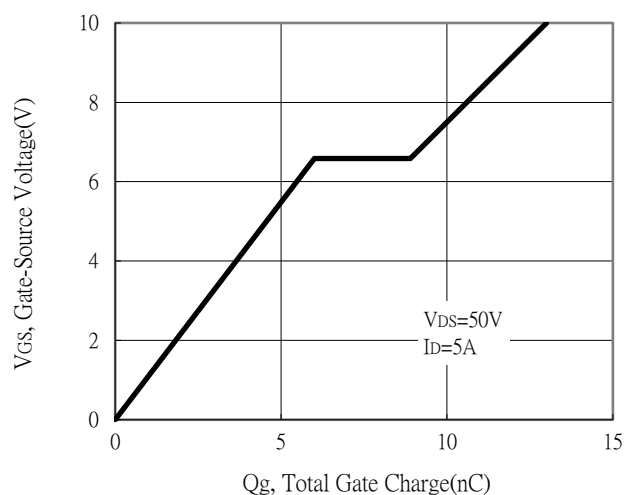
Threshold Voltage vs Junction Temperature



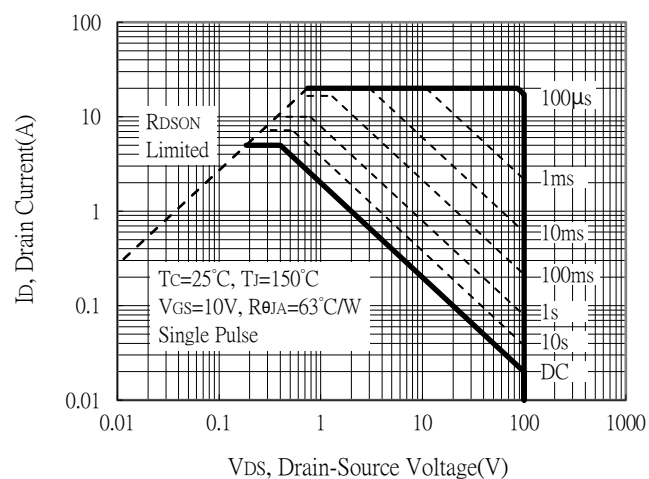
Forward Transfer Admittance vs Drain Current



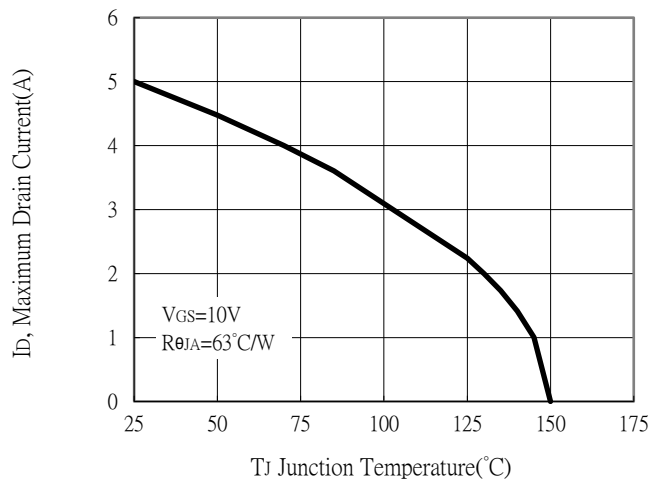
Gate Charge Characteristics



Maximum Safe Operating Area

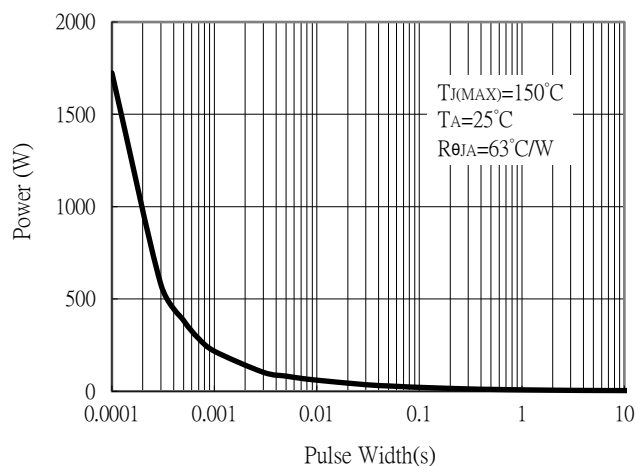


Maximum Drain Current vs Junction Temperature

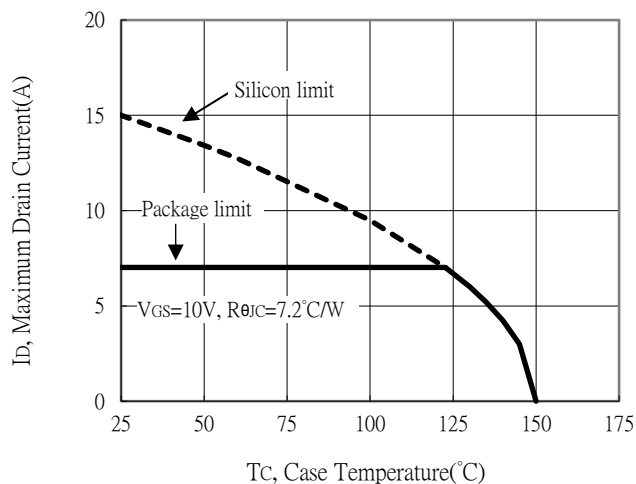


Typical Characteristics

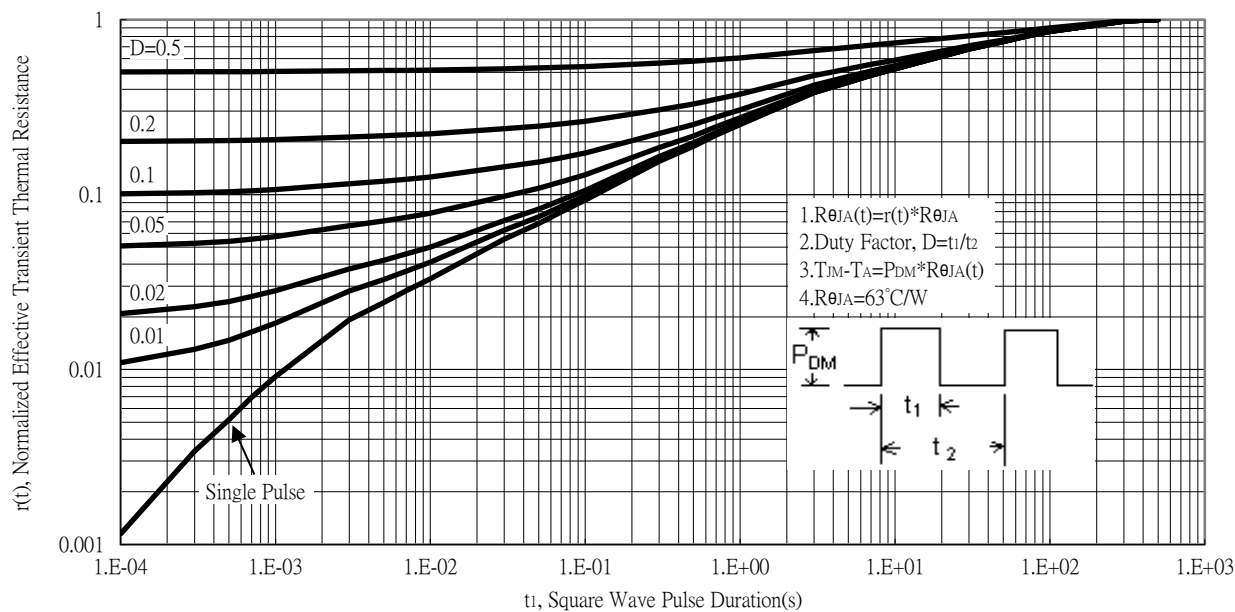
Single Pulse Power Rating, Junction to Ambient



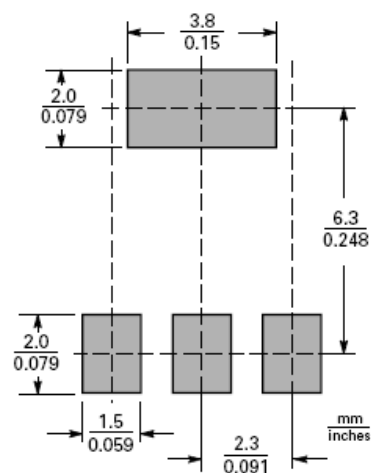
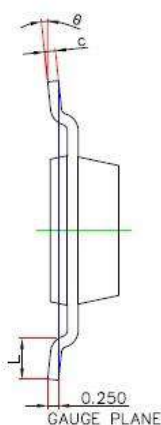
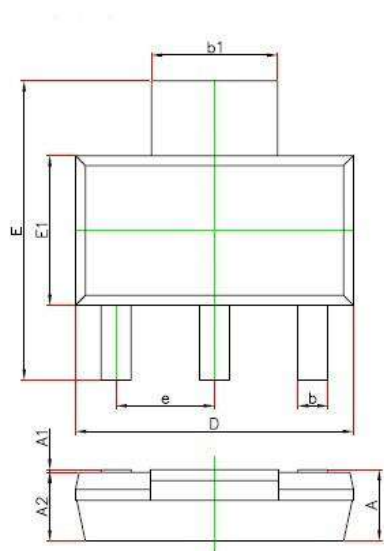
Maximum Drain Current vs Case Temperature



Transient Thermal Response Curves



SOT-223 Dimension



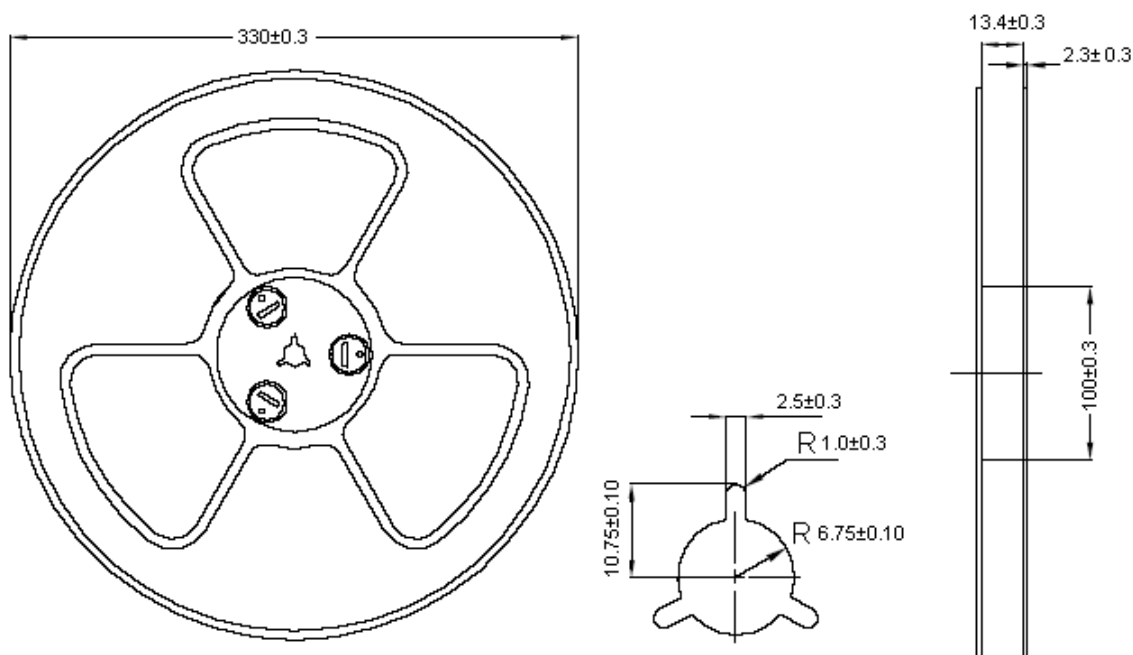
Unit ($\frac{\text{mm}}{\text{inch}}$)

3-Lead SOT-223 Plastic Surface Mount Package

Recommended Soldering Footprint

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	-	0.071	-	1.800	D	0.248	0.264	6.300	6.700
A1	0.001	0.004	0.020	0.100	E	0.264	0.287	6.700	7.300
A2	0.059	0.067	1.500	1.700	E1	0.130	0.146	3.300	3.700
b	0.026	0.033	0.660	0.840	e	0.091	BSC	2.300	BSC
b1	0.114	0.122	2.900	3.100	L	0.030	-	0.750	-
c	0.009	0.014	0.230	0.350	θ	0°	10°	0°	10°

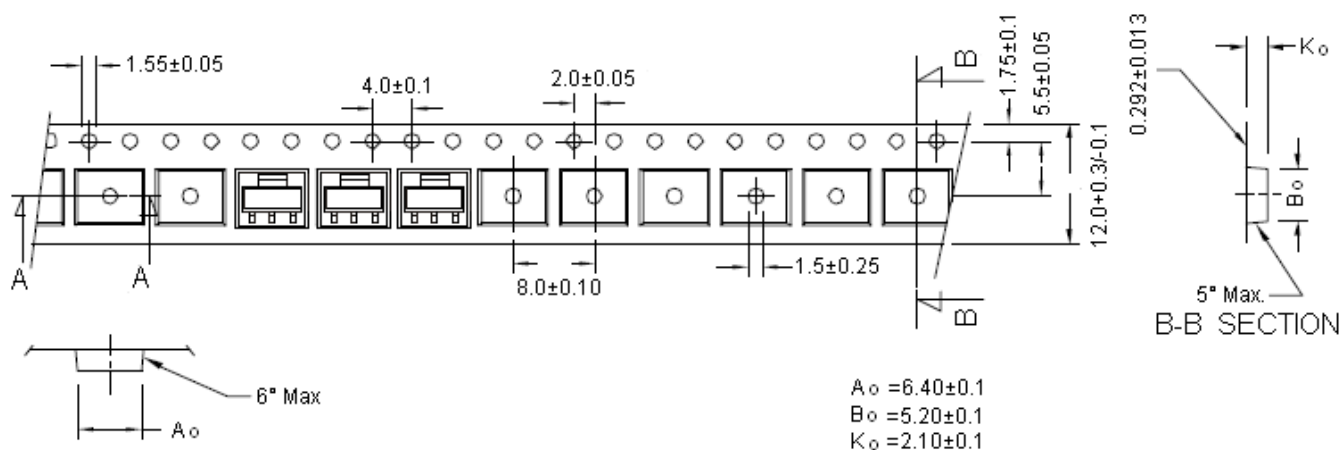
Reel Dimension



UNIT : mm

NOTE : 1. Material : Anti-static polystyrene
2. Surface resistivity $10^9 \Omega/\text{sq}$

Carrier Tape Dimension



Notes:

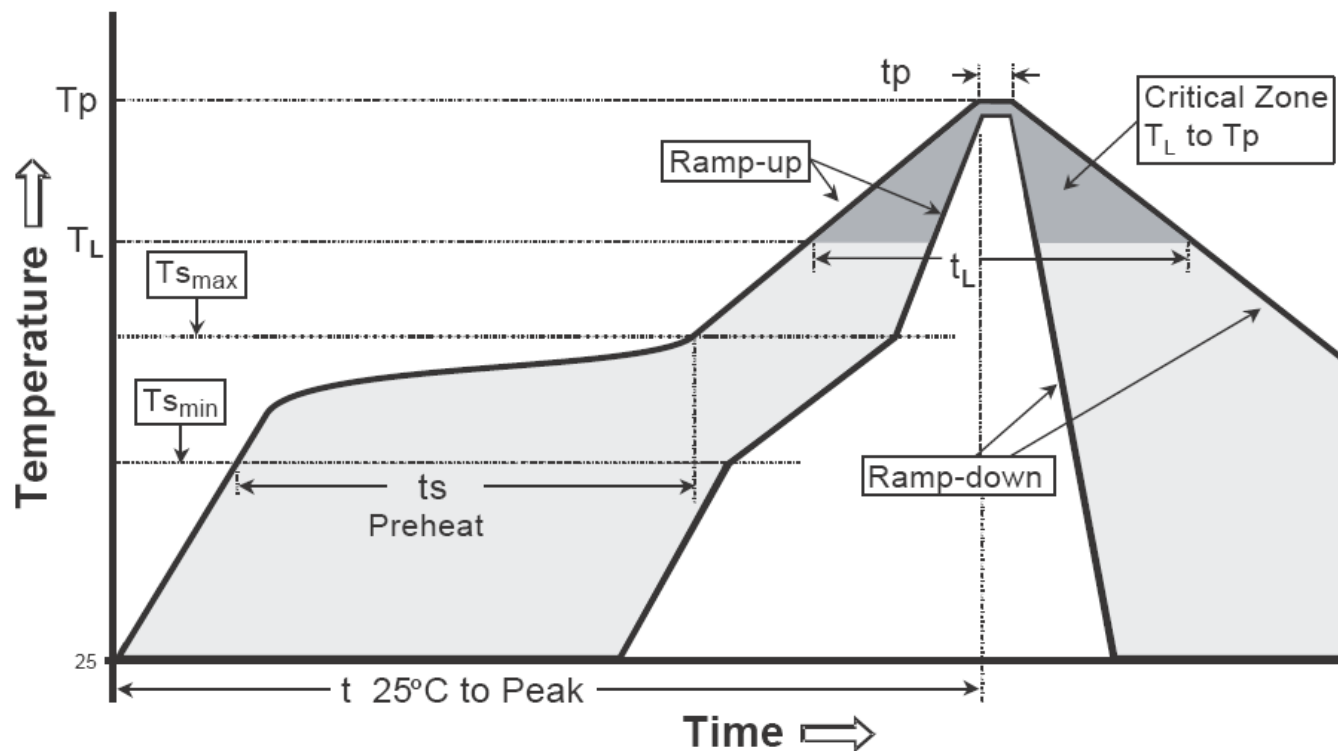
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene
4. A_o & B_o measured on a plane 0.3mm above the bottom of the pocket.
5. K_o measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Uni : millimeter

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) -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.