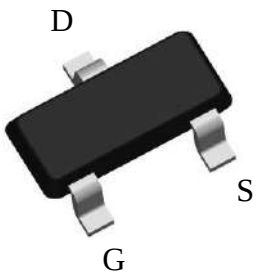
N-Channel Enhancement Mode MOSFET

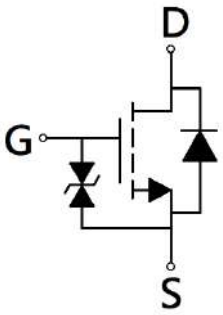
Features:

- ESD protected gate, typical 3kV (HBM)
- High speed switching
- Easily designed drive circuits
- Low-voltage drive
- Easy to use in parallel
- RoHS compliant package

SOT-23



BV_{DSS}	20V
I_D@V_{GS}=4.5V, T_A=25°C	0.67A
$R_{DS(ON)}$ typ.@V_{GS}=4.5V, I_D=0.2A	0.32Ω
$R_{DS(ON)}$ typ.@V_{GS}=2.5V, I_D=0.2A	0.4Ω
$R_{DS(ON)}$ typ.@V_{GS}=1.8V, I_D=0.2A	0.8Ω



G : Gate S : Source D : Drain

Ordering Information

Device	Package	Shipping
KWNAK9	SOT-23 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

Absolute Maximum Ratings (T_A=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±8	
Continuous Drain Current @ V_{GS}=4.5V, T_A=25°C	I_D	0.67	A
Continuous Drain Current @ V_{GS}=4.5V, T_A=70°C		0.54	
Pulsed Drain Current *a	I_{DM}	2.7	
Continuous Body Diode Forward Current @ T_A=25°C	I_S	0.3	
ESD susceptibility *b	V_{ESD}	3000	V
Total Power Dissipation @ T_A=25°C	P_D	0.35	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	°C

Thermal Data

Parameter	Symbol	Steady State	Unit
Thermal Resistance, Junction-to-ambient	$R_{\theta JA}$	357	°C/W

Note:
*a. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150℃. Ratings are based on low frequency and low duty cycles to keep initial T_J=25℃.
*b. Human body model, 1.5kΩ in series with 100pF.

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	20	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	0.3	-	1.2		V_{DS}=V_{GS}, I_D=250μA
G_{FS}	-	1	-	S	V_{DS}=5V, I_D=0.2A
I_{GSS}	-	-	±10	μA	V_{GS}=±8V, V_{DS}=0V
I_{DSS}	-	-	1		V_{DS}=16V, V_{GS}=0V
$R_{DS(ON)}$	-	0.32	0.45	Ω	V_{GS}=4.5V, I_D=0.2A
	-	0.4	0.6		V_{GS}=2.5V, I_D=0.2A
	-	0.8	1.2		V_{GS}=1.8V, I_D=0.2A
Dynamic					
Ciss	-	32	-	pF	V_{DS}=10V, V_{GS}=0V, f=1MHz
Coss	-	19	-		
Crss	-	17	-		
Qg *1, 2	-	0.8	-	nC	V_{DS}=10V, I_D=0.2A, V_{GS}=4.5V
Qgs *1, 2	-	0.2	-		
Qgd *1, 2	-	0.15	-		
$t_{d(ON)}$ *1, 2	-	4.8	-	ns	V_{DS}=10V, I_D=0.2A, V_{GS}=4.5V, R_{GS}=10Ω
tr *1, 2	-	16	-		
$t_{d(OFF)}$ *1, 2	-	20	-		
t_f *1, 2	-	15.6	-		
Source-Drain Diode					
V_{SD} *1	-	0.8	1.2	V	I_S=0.2A, V_{GS}=0V
trr	-	7	-	ns	I_F=0.2A, dI_F/dt=100A/μs
Qrr	-	1	-	nC	

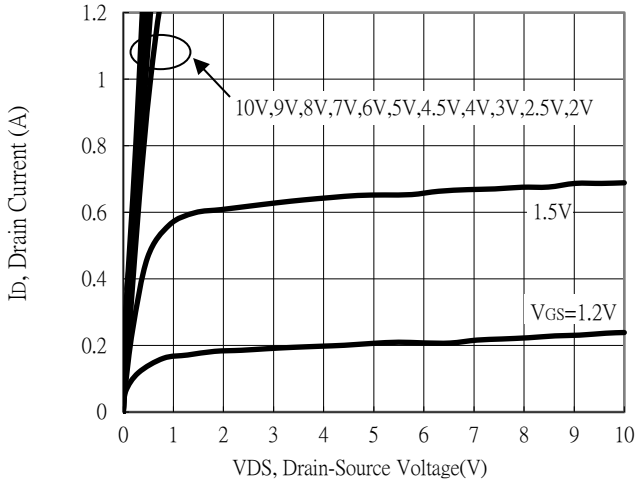
Note:

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

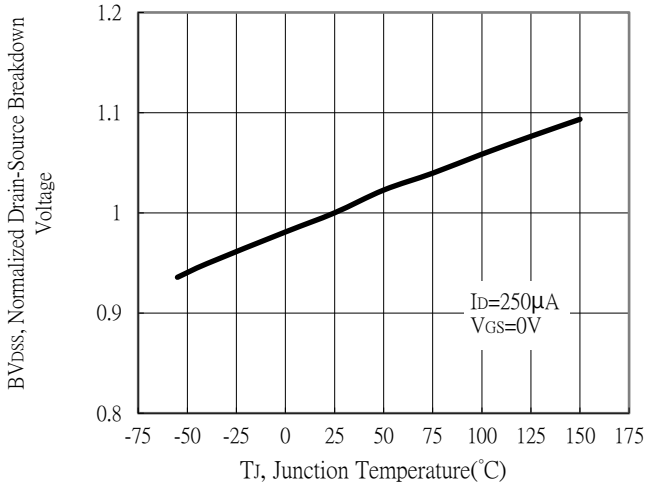
*2. Independent of operating temperature

Typical Characteristics

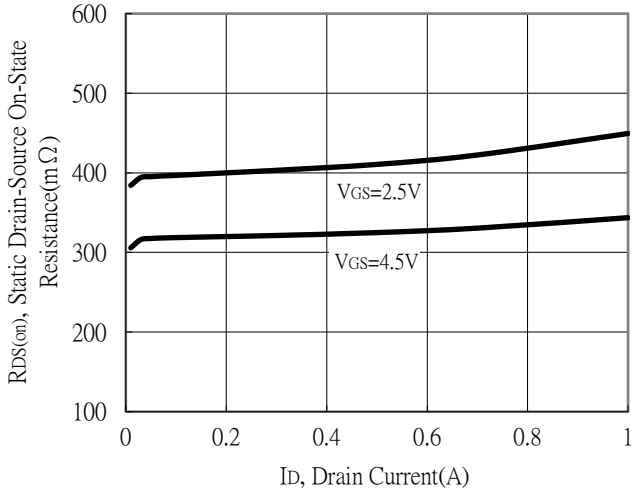
Typical Output Characteristics



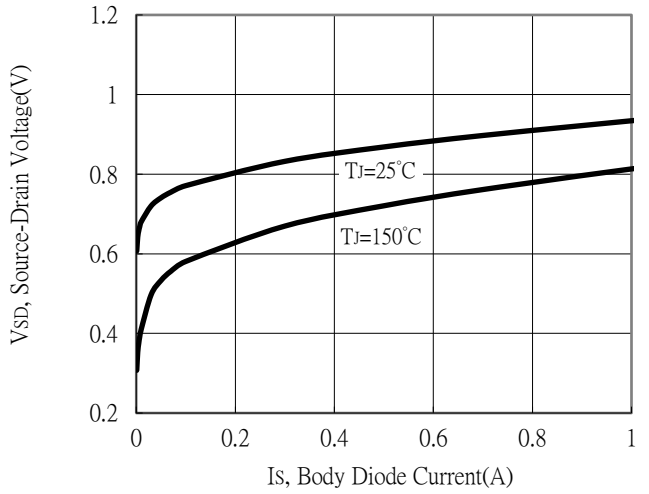
Breakdown Voltage vs Junction Temperature



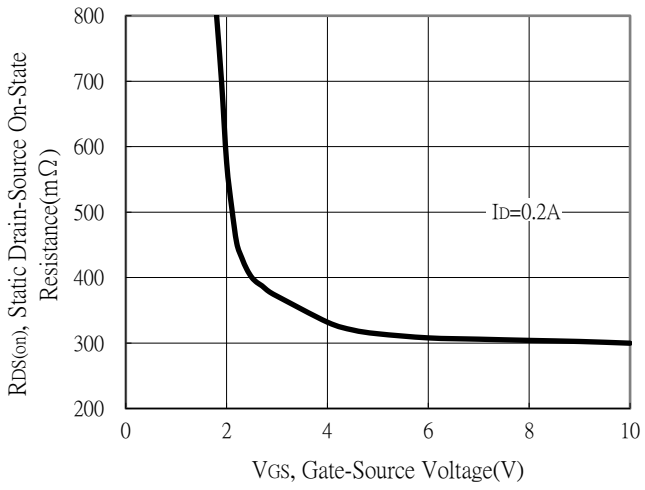
Static Drain-Source On-State resistance vs Drain Current



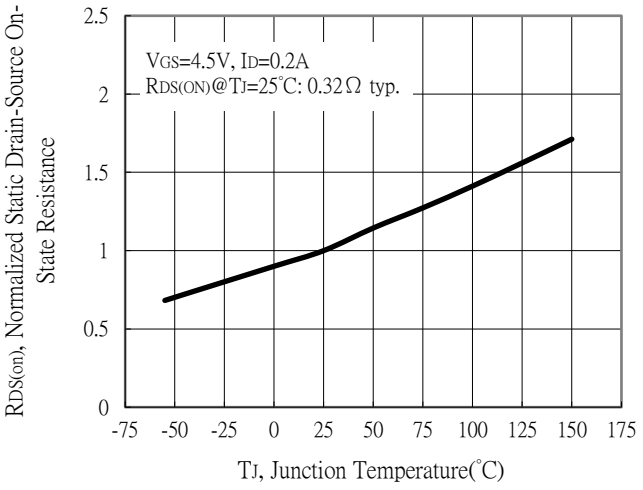
Body Diode Current vs Source-Drain Voltage



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

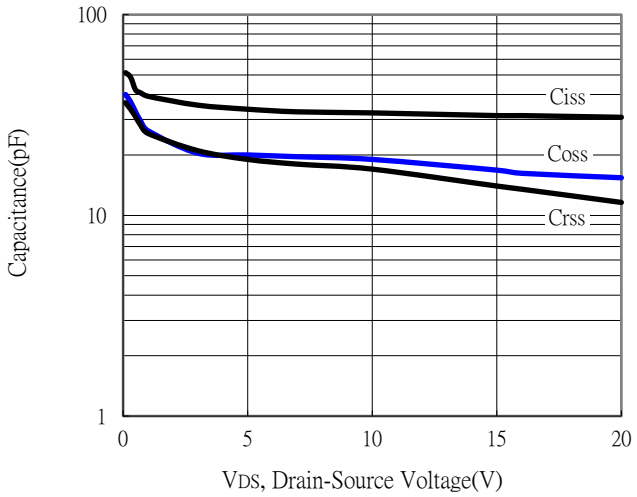


Drain-Source On-State Resistance vs Junction Temperature

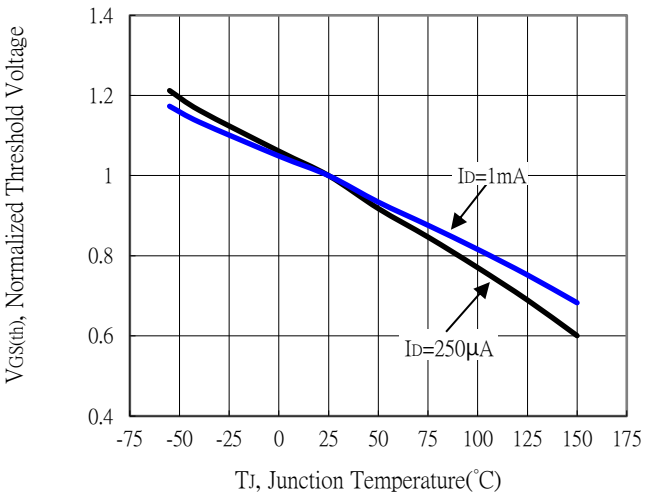


Typical Characteristics (Cont.)

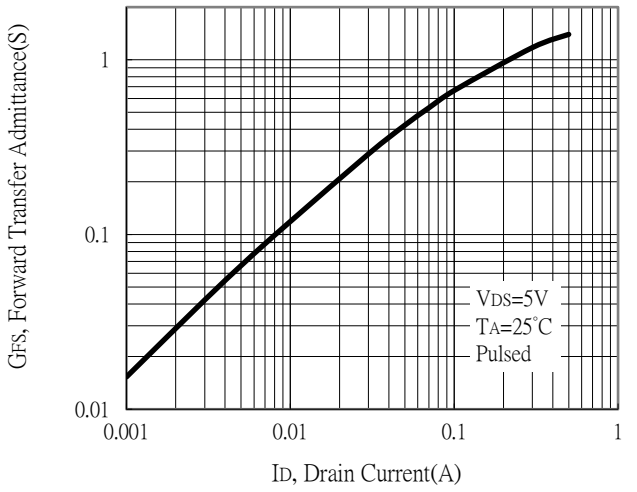
Capacitance vs Drain-to-Source Voltage



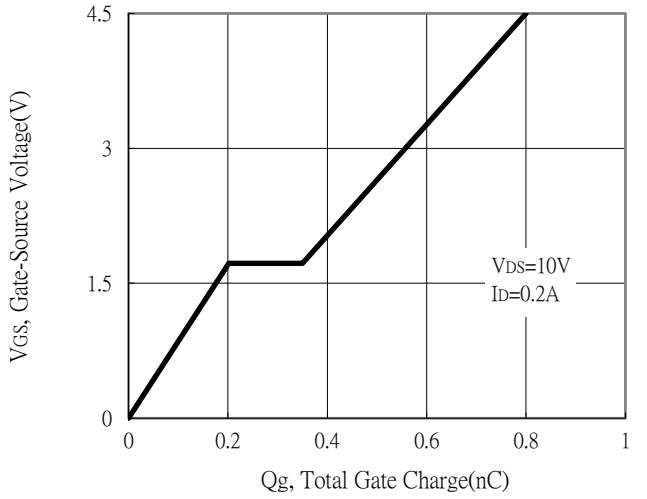
Threshold Voltage vs Junction Temperature



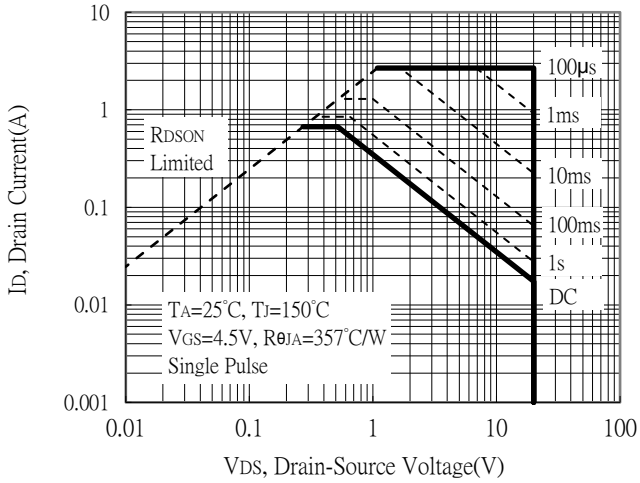
Forward Transfer Admittance vs Drain Current



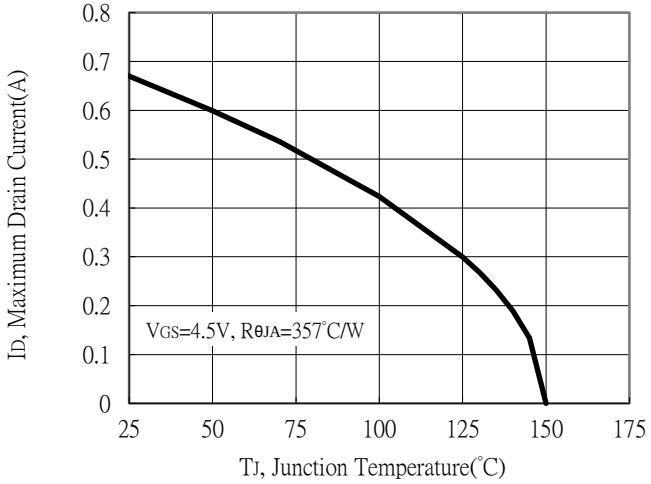
Gate Charge Characteristics



Maximum Safe Operating Area

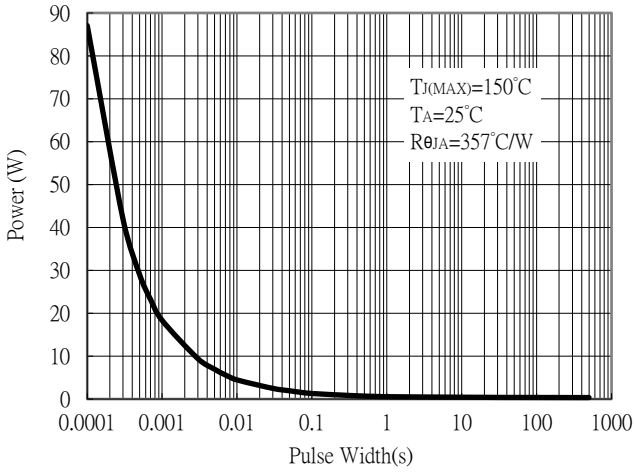


Maximum Drain Current vs Junction Temperature

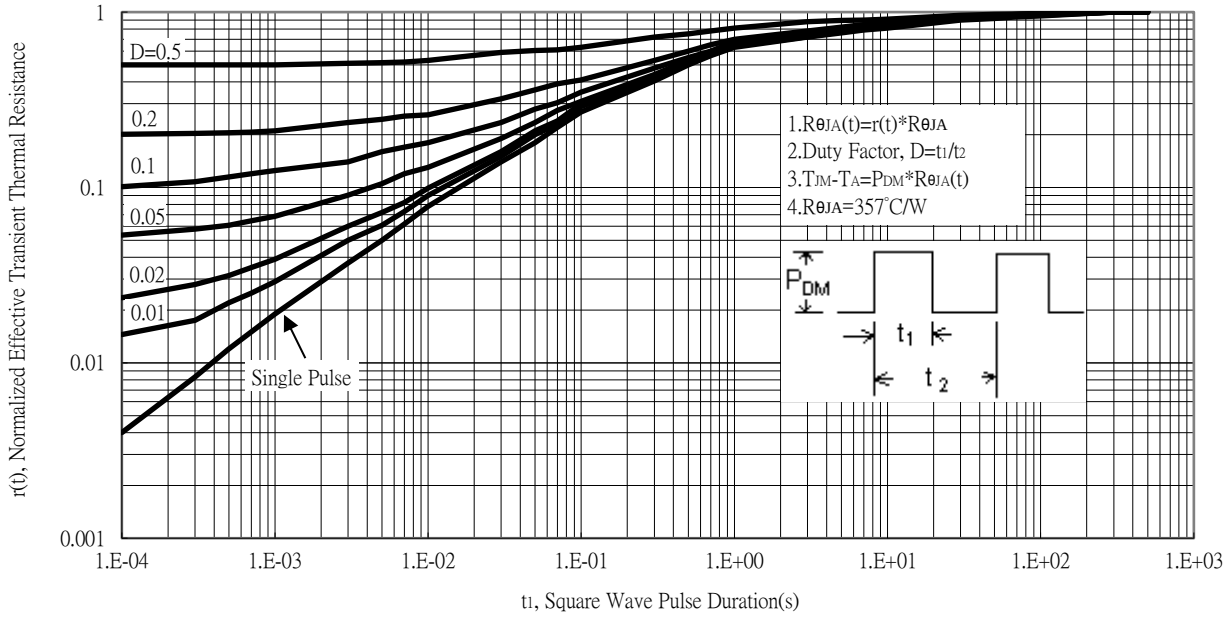


Typical Characteristics (Cont.)

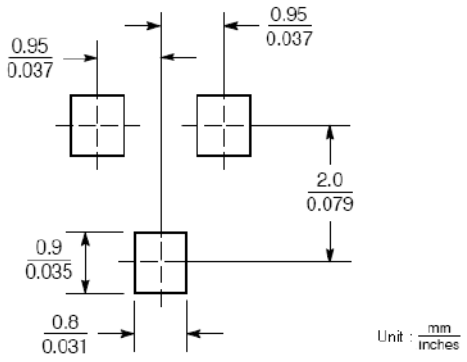
Single Pulse Power Rating, Junction to Ambient



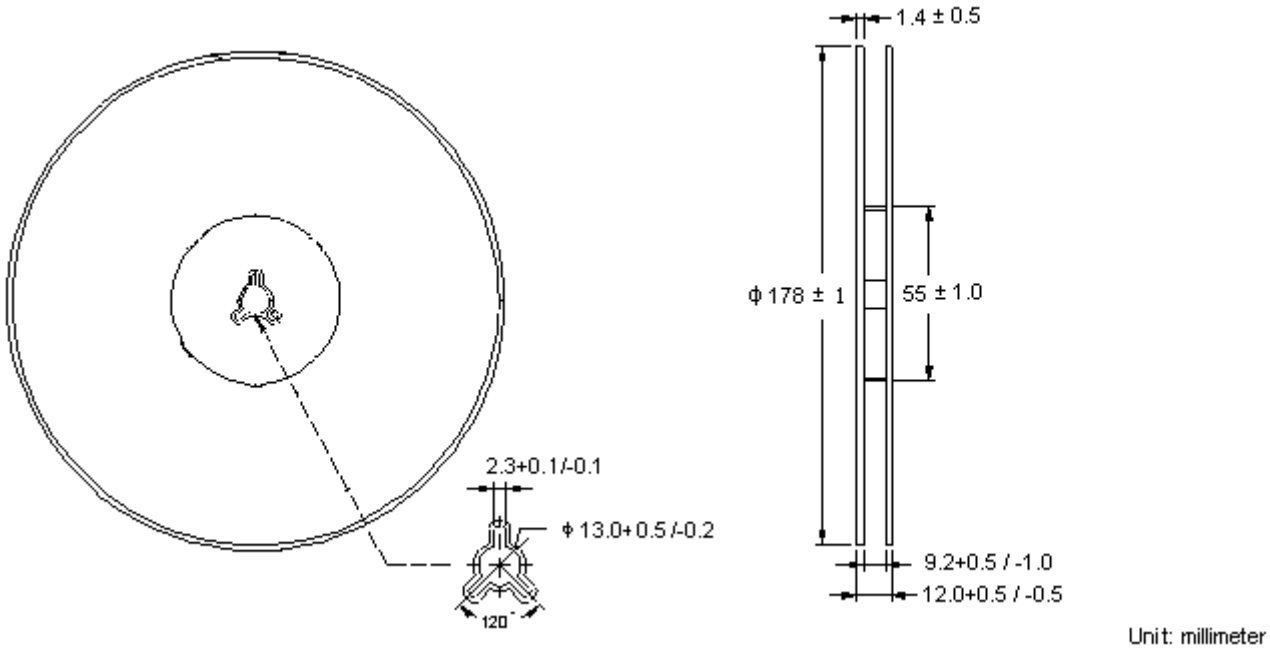
Transient Thermal Response Curves



Recommended Soldering Footprint

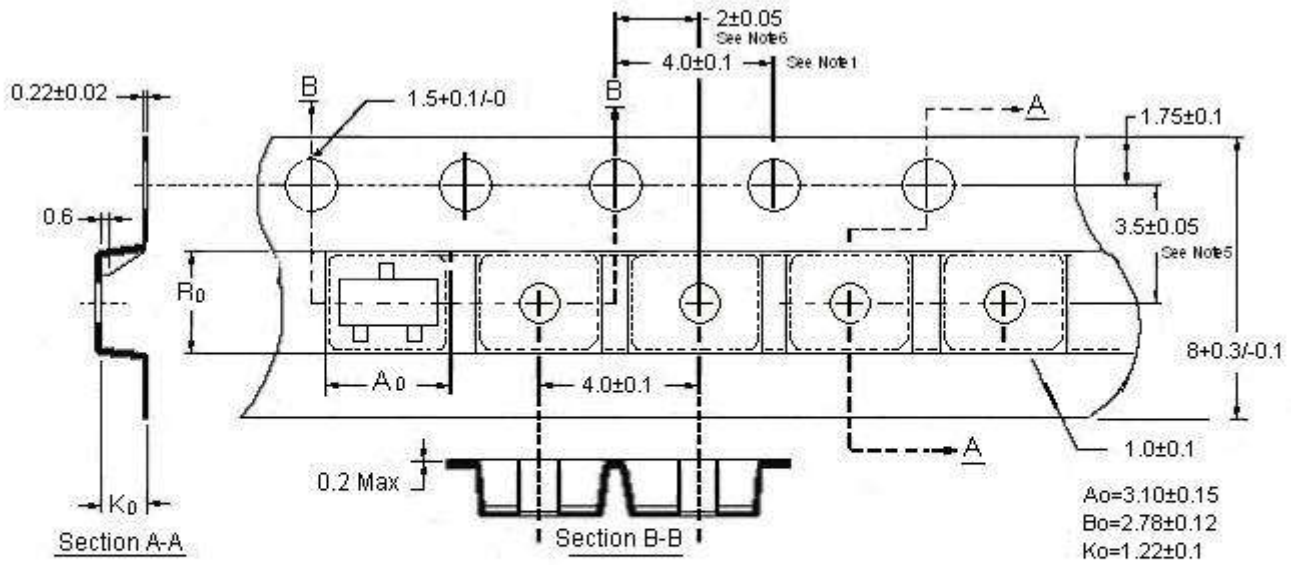


Reel Dimension



Unit: millimeter

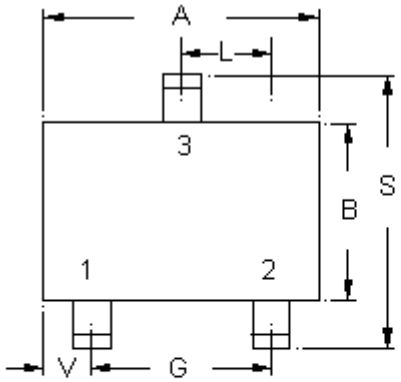
Carrier Tape Dimension

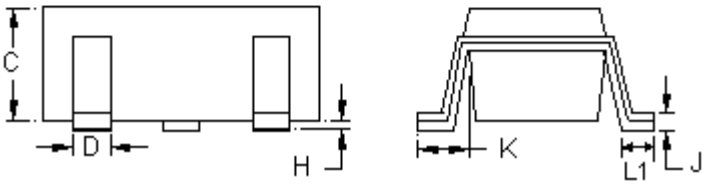


Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material : conductive Black Polystyrene.
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.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

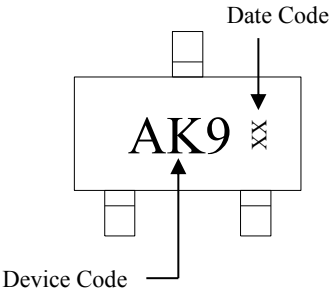
Unit : millimeter

SOT-23 Dimension





Marking:



3-Lead SOT-23 Plastic
Surface Mounted Package

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

Date Code：Year + Month

Year : 9→2019,0→2020,…, etc

Month : 1→Jan,2→Feb, …, 9→Sep, A→Oct, B→Nov, C→Dec

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1102	0.1181	2.80	3.00	J	0.0032	0.0059	0.08	0.15
B	0.0472	0.0551	1.20	1.40	K	0.0217	REF	0.55	REF
C	0.0354	0.0413	0.90	1.05	L	0.0374	TYP	0.95	TYP
D	0.0118	0.0197	0.30	0.50	S	0.0886	0.1004	2.25	2.55
G	0.0709	0.0787	1.80	2.00	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