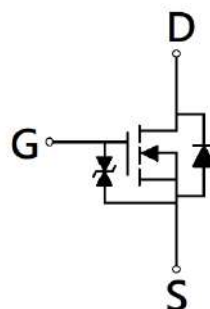
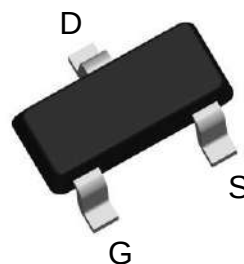


N-Channel Enhancement Mode MOSFET

Features:

- ESD protected gate, typical 2kV (HBM)
- High speed switching
- Easily designed drive circuits
- Low-voltage drive
- Easy to use in parallel
- RoHS compliant package

SOT-23



G : Gate S : Source D : Drain

BV_{DSS}	60V
$I_D @ V_{GS}=4.5V, T_A=25^\circ C$	0.5A
$R_{DS(ON)} \text{ typ.} @ V_{GS}=4.5V, I_D=0.2A$	1.3 Ω
$R_{DS(ON)} \text{ typ.} @ V_{GS}=2.5V, I_D=0.1A$	1.7 Ω

Ordering Information

Device	Package	Shipping
KWNAK6	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}	60	V
Gate-Source Voltage	V _{GS}	±20	
Continuous Drain Current @ V _{GS} =4.5V, T _A =25°C	I _D	0.5	A
Continuous Drain Current @ V _{GS} =4.5V, T _A =70°C		0.4	
Pulsed Drain Current *a	I _{DM}	2	
Continuous Body Diode Forward Current @ T _A =25°C	I _S	0.5	
ESD susceptibility *b	V _{ESD}	2000	V
Total Power Dissipation @ T _A =25°C	P _D	0.7	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 _{θJA}	180	°C/W

Note:

*a. 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.

*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}	60	-	-	V	V _{GS} =0V, I _D =250μA
V _{GS(th)}	0.5	-	1.5		V _{DS} =V _{GS} , I _D =250μA
G _{FS}	-	0.5	-	S	V _{DS} =5V, I _D =0.2A
I _{GSS}	-	-	±10	μA	V _{GS} =±16V, V _{DS} =0V
I _{DSS}	-	-	1		V _{DS} =48V, V _{GS} =0V
R _{DS(ON)}	-	1.3	3	Ω	V _{GS} =4.5V, I _D =0.2A
	-	1.7	5		V _{GS} =2.5V, I _D =0.1A
Dynamic					
C _{iss}	-	25	-	pF	V _{DS} =30V, V _{GS} =0V, f=1MHz
C _{oss}	-	8	-		
C _{rss}	-	7	-		
R _g	-	2.7	-	Ω	f=1MHz
Q _g *1, 2	-	0.75	-	nC	V _{DS} =30V, I _D =0.2A, V _{GS} =4.5V
Q _{gs} *1, 2	-	0.35	-		
Q _{gd} *1, 2	-	0.15	-		
t _{d(ON)} *1, 2	-	3	-	ns	V _{DS} =30V, I _D =0.2A, V _{GS} =10V, R _{GS} =25Ω
t _r *1, 2	-	16	-		
t _{d(OFF)} *1, 2	-	11	-		
t _f *1, 2	-	16	-		
Source-Drain Diode					
V _{SD} *1	-	0.8	1.2	V	I _S =0.2A, V _{GS} =0V
t _{rr}	-	9	-	ns	I _F =0.2A, dI _F /dt=100A/μs
Q _{rr}	-	2.7	-	nC	

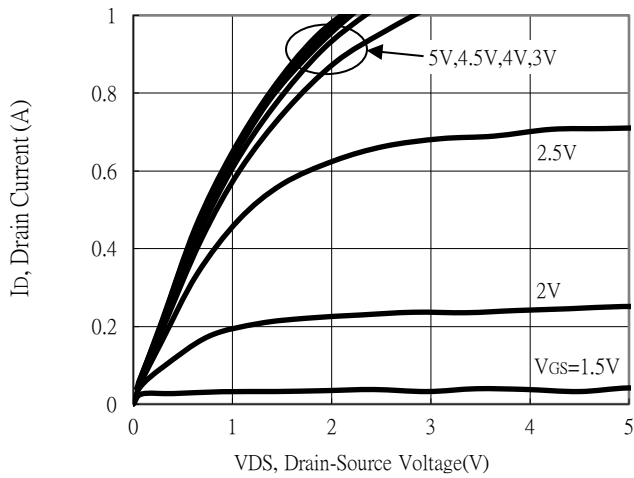
Note:

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

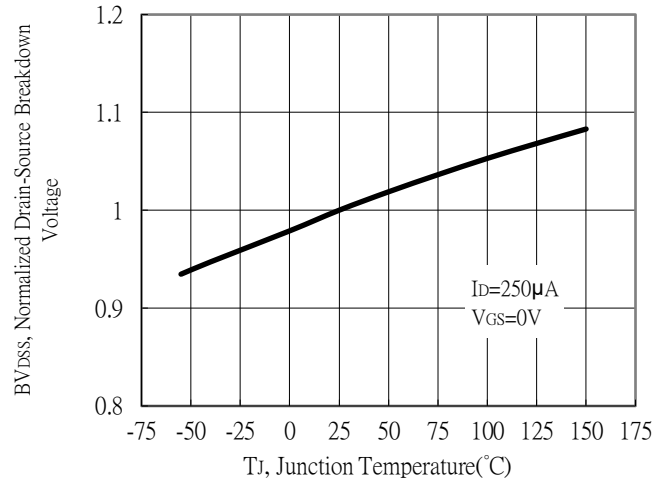
*2. Independent of operating temperature

Typical Characteristics

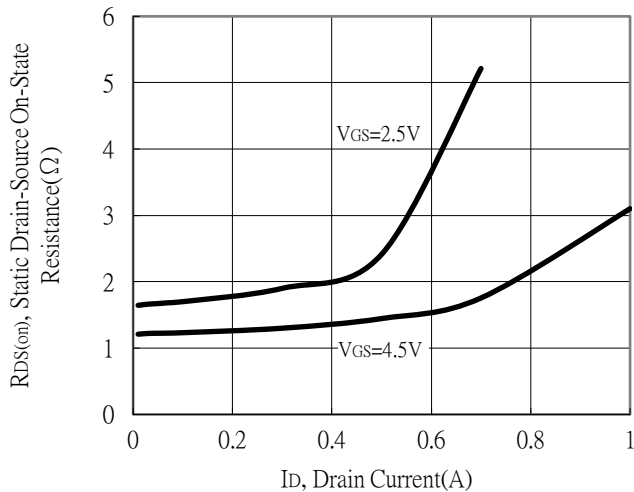
Typical Output Characteristics



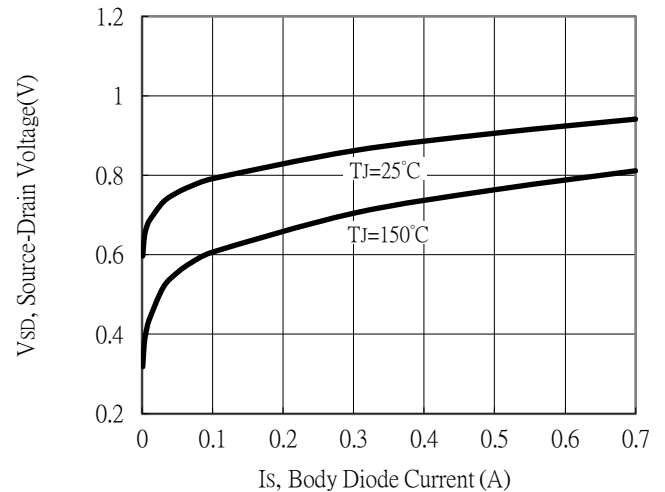
Breakdown Voltage vs Ambient Temperature



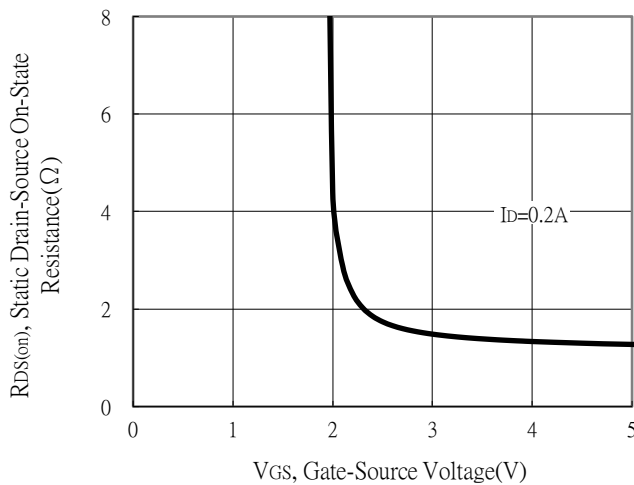
Static Drain-Source On-State resistance vs Drain Current



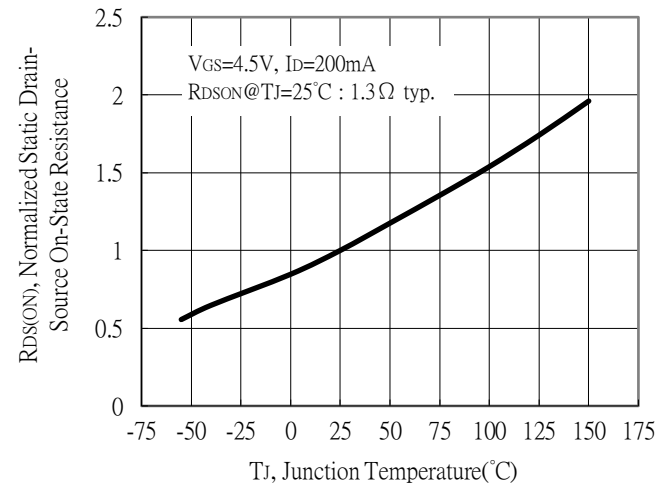
Body Diode Current vs Source-Drain Voltage



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

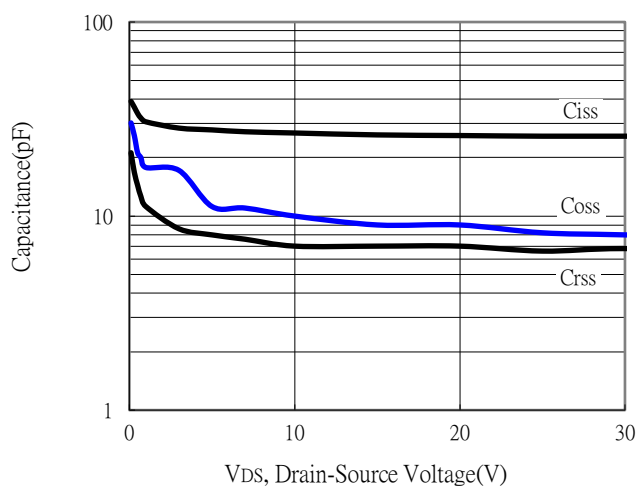


Drain-Source On-State Resistance vs Junction Temperature

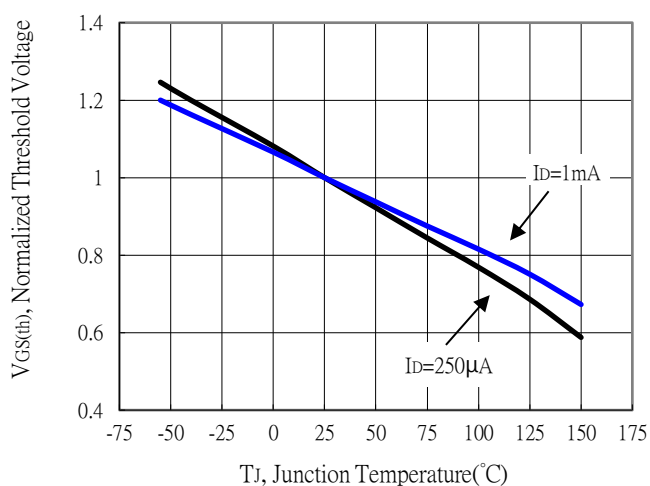


Typical Characteristics (Cont.)

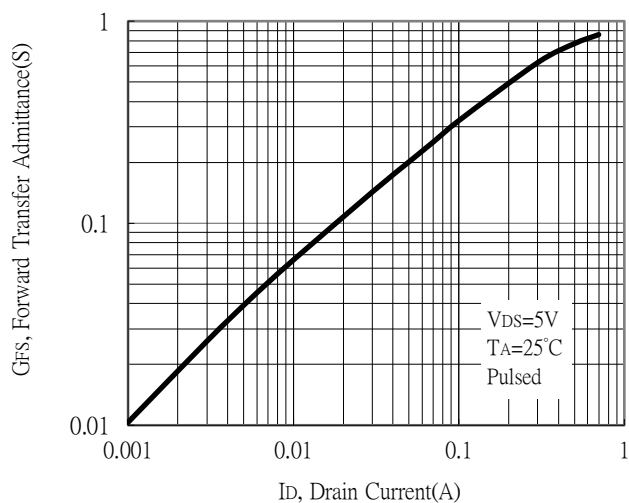
Capacitance vs Drain-to-Source Voltage



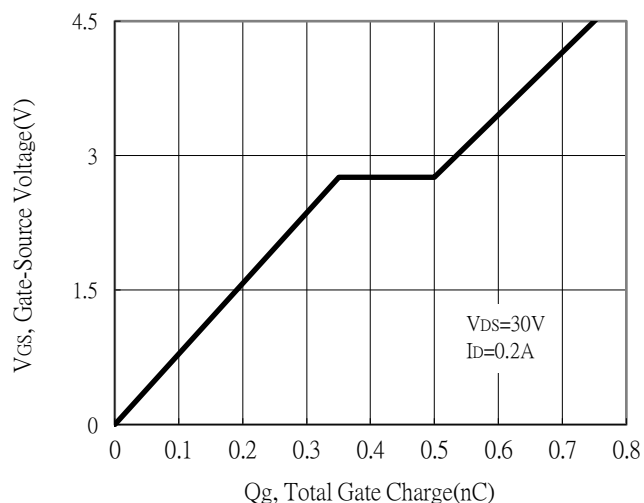
Threshold Voltage vs Junction Temperature



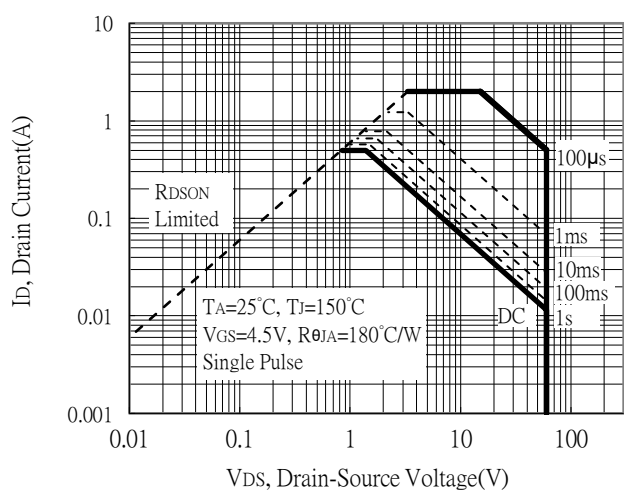
Forward Transfer Admittance vs Drain Current



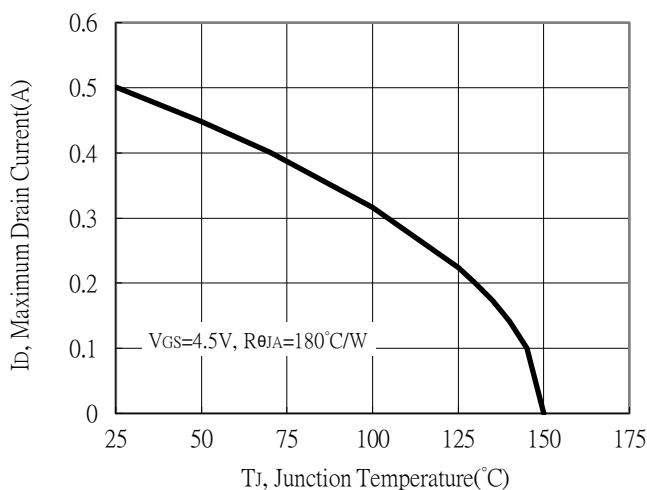
Gate Charge Characteristics



Maximum Safe Operating Area

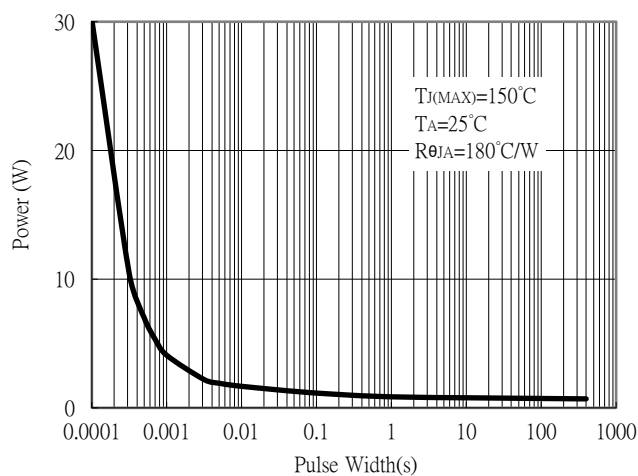


Maximum Drain Current vs Junction Temperature

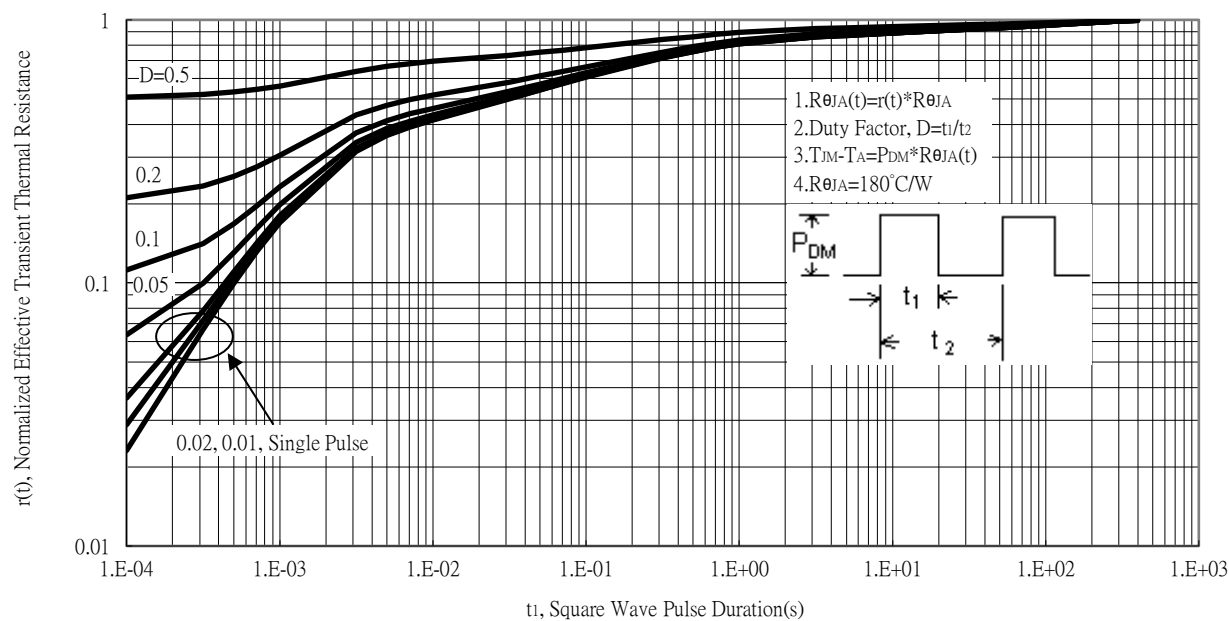


Typical Characteristics (Cont.)

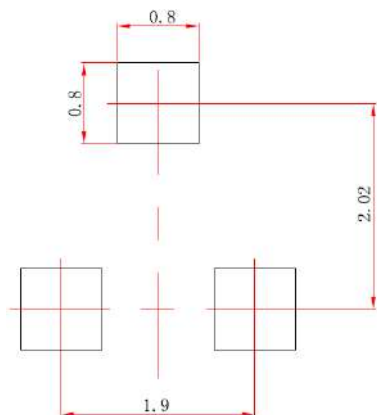
Single Pulse Power Rating, Junction to Ambient



Transient Thermal Response Curves

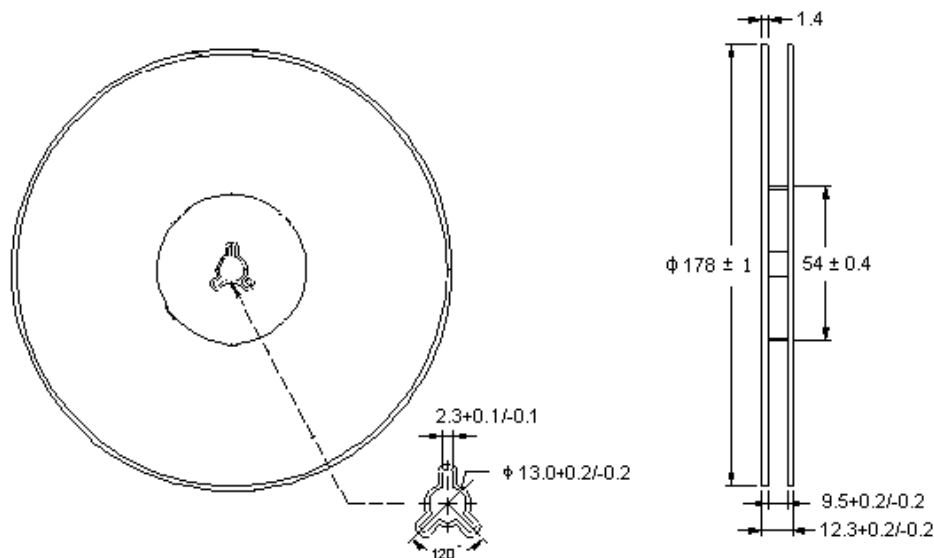


Recommended Soldering Footprint



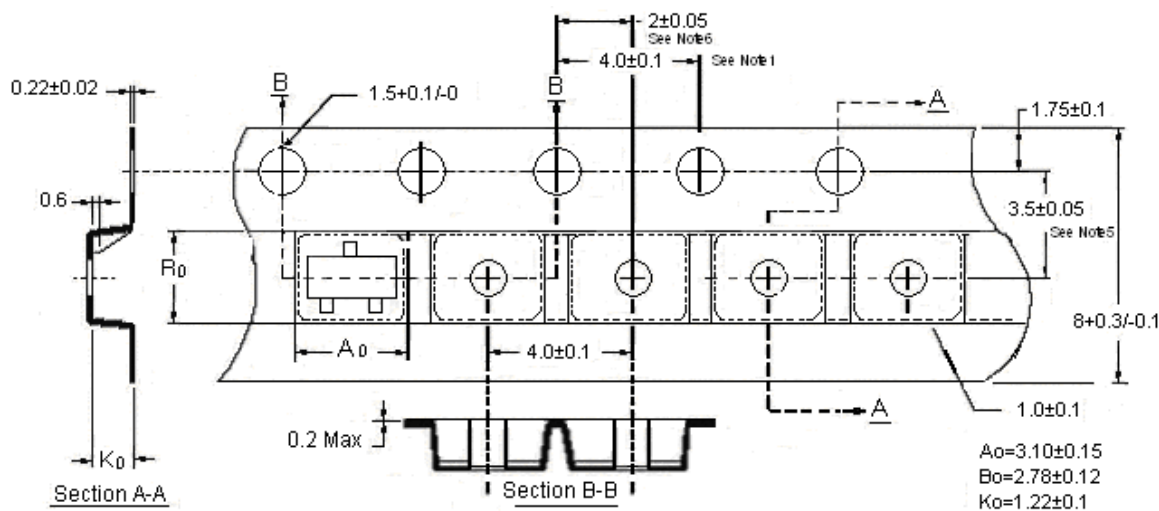
Unit : mm

Reel Dimension

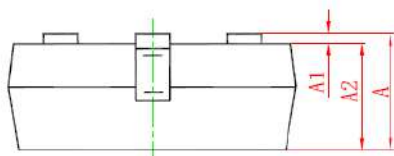
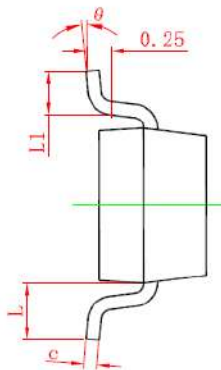
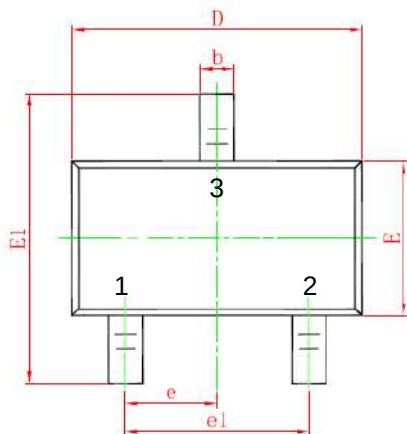


Unit: millimeter

Carrier Tape Dimension

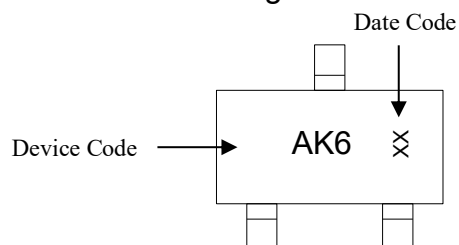


SOT-23 Dimension



Date Code: Year+Month
 Year: 3→2003, 4→2004
 Month: 1→1, 2→2, . . .
 9→9, A→10, B→11, C→12

Marking:



3-Lead SOT-23 Plastic
 Surface Mounted Package

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

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.035	0.045	0.900	1.150	E1	0.089	0.100	2.250	2.550
A1	0.000	0.004	0.000	0.100	e	0.037 TYP		0.950 TYP	
A2	0.035	0.041	0.900	1.050	e1	0.071	0.079	1.800	2.000
b	0.012	0.020	0.300	0.500	L	0.022 REF		0.550 REF	
c	0.003	0.006	0.080	0.150	L1	0.012	0.020	0.300	0.500
D	0.110	0.118	2.800	3.000	θ	0°	8°	0°	8°
E	0.047	0.055	1.200	1.400					