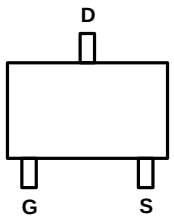
P-Channel Enhancement Mode MOSFET

Features

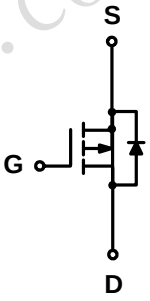
- -20V/-2.5A,
  $R_{DS(ON)}$= 85mΩ (typ.) @ V_{GS}= -4.5V
  $R_{DS(ON)}$= 110mΩ (typ.) @ V_{GS}= -2.5V
- Super High Dense Cell Design
- Reliable and Rugged

Pin Description

Top View



SOT-23



P Channel MOSFET

Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.

Ordering and Marking Information

AM2301 □□ Packing Package	Package R : SOT23-3L Packing Blank : Tube A : Taping
AM2301 : A1XXX	XXX – Date Code

Absolute Maximum Ratings (T_A=25°C Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
V_{DSS}	Drain-Source Voltage		-20	V
V_{GSS}	Gate-Source Voltage		±12	
I_D*	Continue Drain Current		-2.5	A
I_{DM}*	Pulsed Drain Current		-10	
I_S*	Diode continuous forward current		-1.5	A
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	
P_D*	Maximum Power Dissipation	T_A=25°C	0.83	W
		T_A=100°C	0.3	
$R_{\theta JA}$*	Thermal Resistance-Junction to Ambient		150	°C/W

Notes：

*Surface Mounted on 1in^2 pad area, t ≤ 10sec.

Electrical Characteristics (T_A=25°C Unless Otherwise Noted)

Symbol	Parameter	Test Condition	AM2301 Min.	AM2301 Typ.	AM2301 Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=-250μA	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-16V, V_{GS}=0V			-1	μA
		T_J=85°C			-30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=-250μA	-0.45	-0.7	-1	V
I_{GSS}	Gate Leakage Current	V_{GS}=±12V, V_{DS}=0V			±100	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	V_{GS}=-4.5V, I_{DS}=-2.5A		85	130	mΩ
		V_{GS}=-2.5V, I_{DS}=-2A		110	190	
V_{SD}	Diode Forward Voltage	I_{SD}=-0.5A , V_{GS}=0V		-0.8	-1.3	V
Gate Charge Characteristics [b]						
Q_g	Total Gate Charge	V_{DS}=-10V, V_{GS}=-4.5V, I_{DS}=-2.5A		5	7	nC
Q_{gs}	Gate-Source Charge			0.7		
Q_{gd}	Gate-Drain Charge			0.6		

Electrical Characteristics (Cont.) (T_A=25°C Unless Otherwise Noted)

Symbol	Parameter	Test Condition	AM2301			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics [b]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz		9.2		Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, Frequency=1.0MHz		360		pF
C_{oss}	Output Capacitance			80		
C_{rss}	Reverse Transfer Capacitance			50		
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-10V, R_L=10Ω I_{DS}=-1A, V_{GEN}=-4.5V, R_G=6Ω		8	16	ns
T_r	Turn-on Rise Time			7	15	
$t_{d(OFF)}$	Turn-off Delay Time			18	35	
T_f	Turn-off Fall Time			8	15	

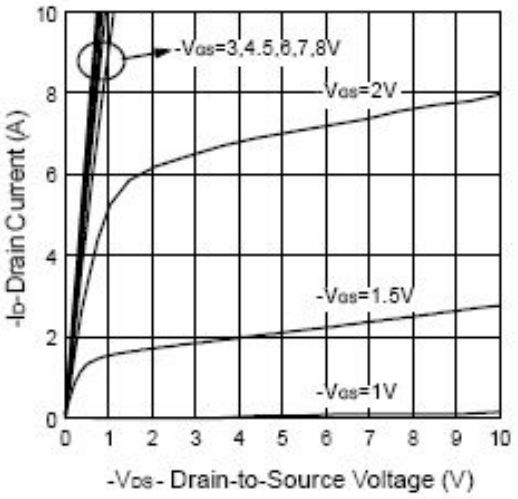
Notes：

a : Pulse test ; pulse width≤300μs, duty cycle≤2%.

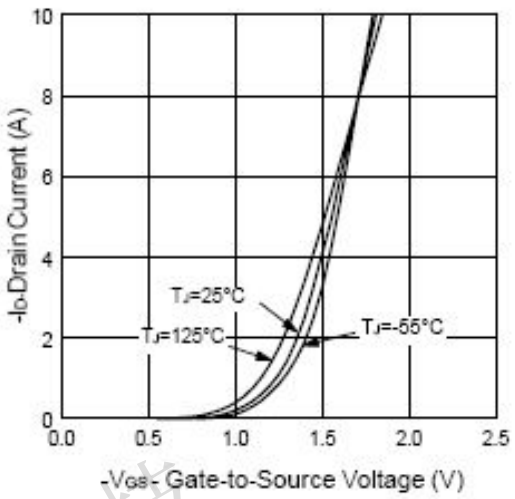
b : Guaranteed by design, not subject to production testing.

Typical Characteristics

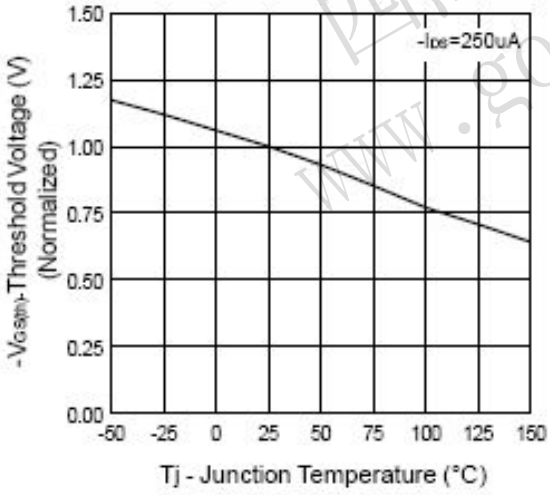
Output Characteristics



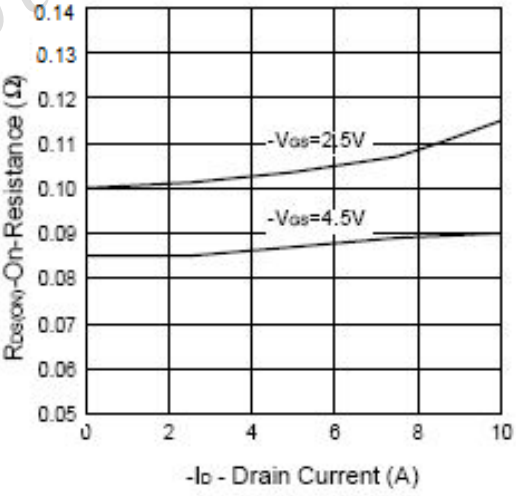
Transfer Characteristics



Threshold Voltage vs. Junction Temperature

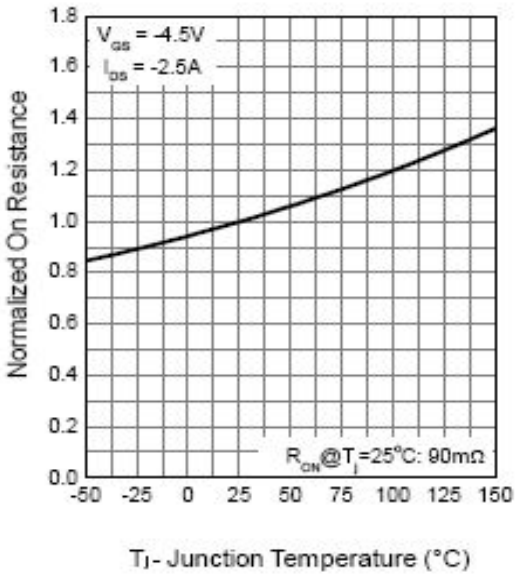


On-Resistance vs. Drain Current

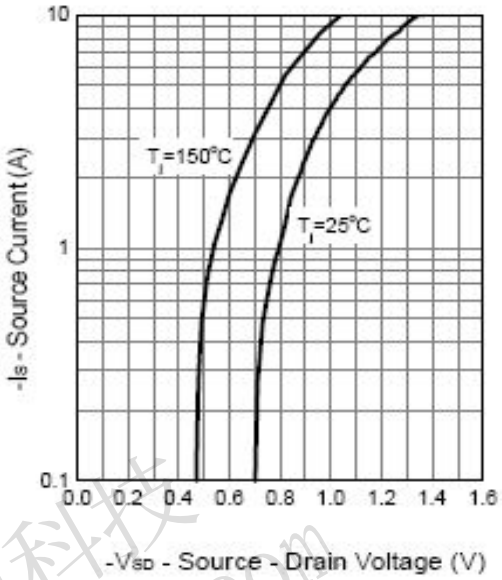


Typical Characteristics

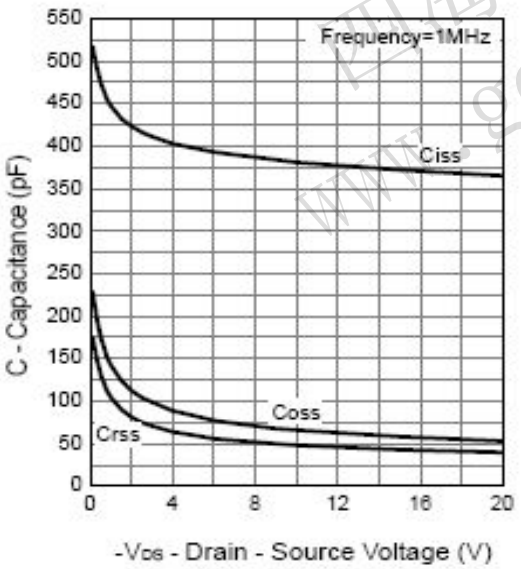
Drain-Source On Resistance



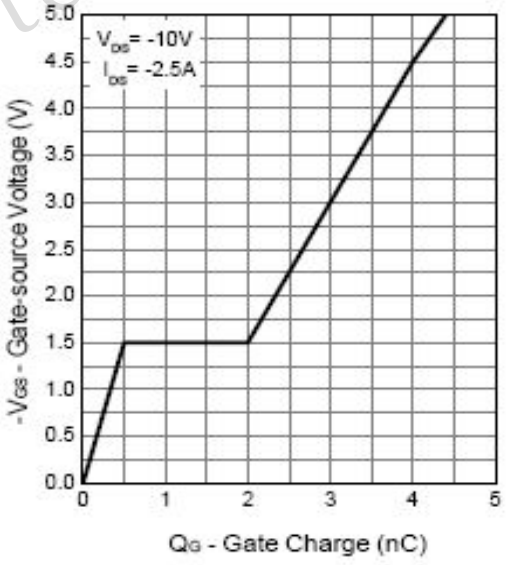
Source-Drain Diode Forward



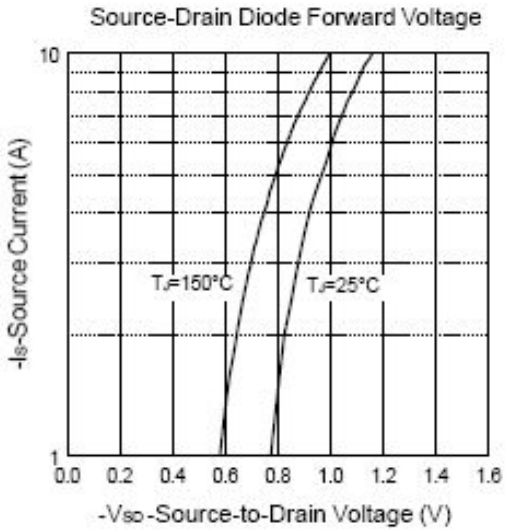
Capacitance

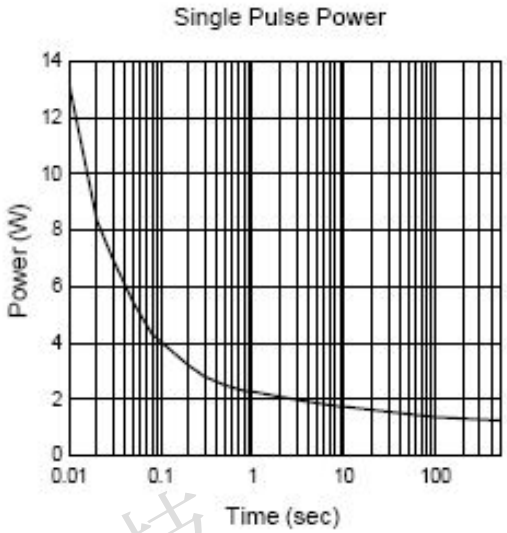


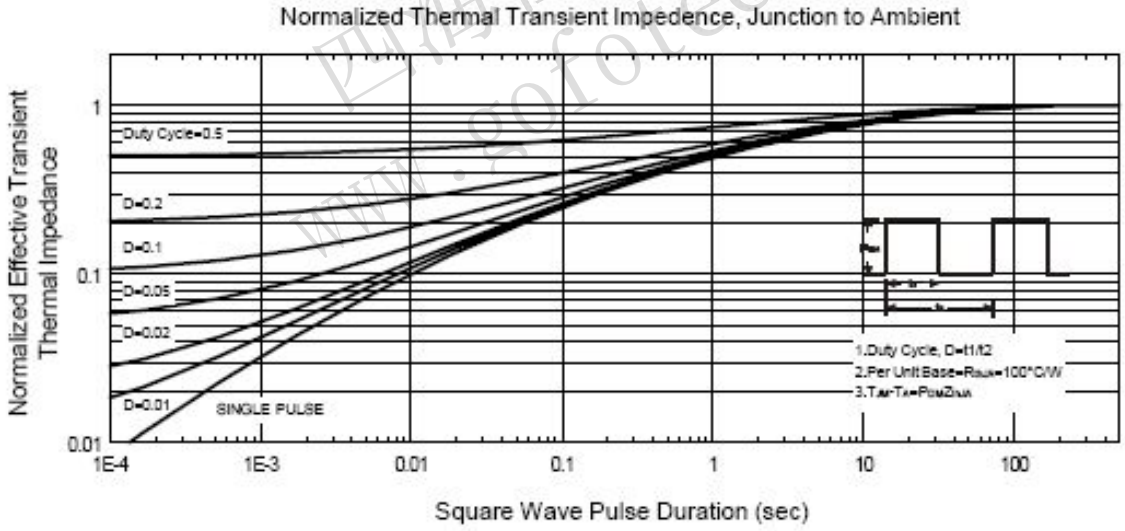
Gate Charge



Typical Characteristics

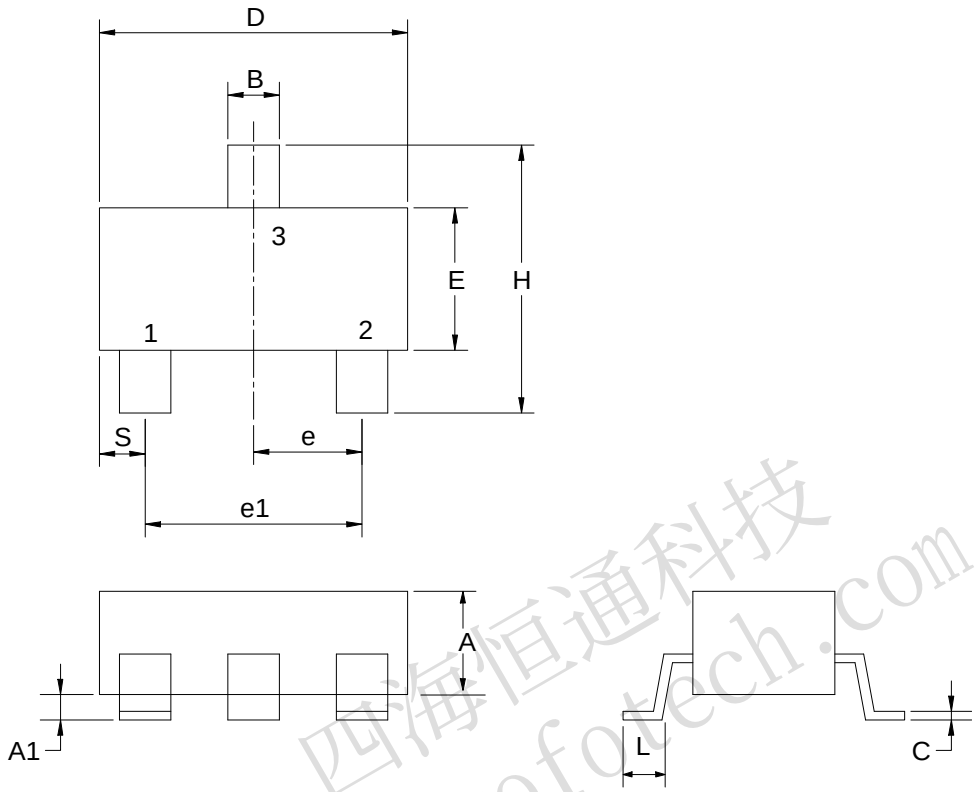






Package Information

SOT-23



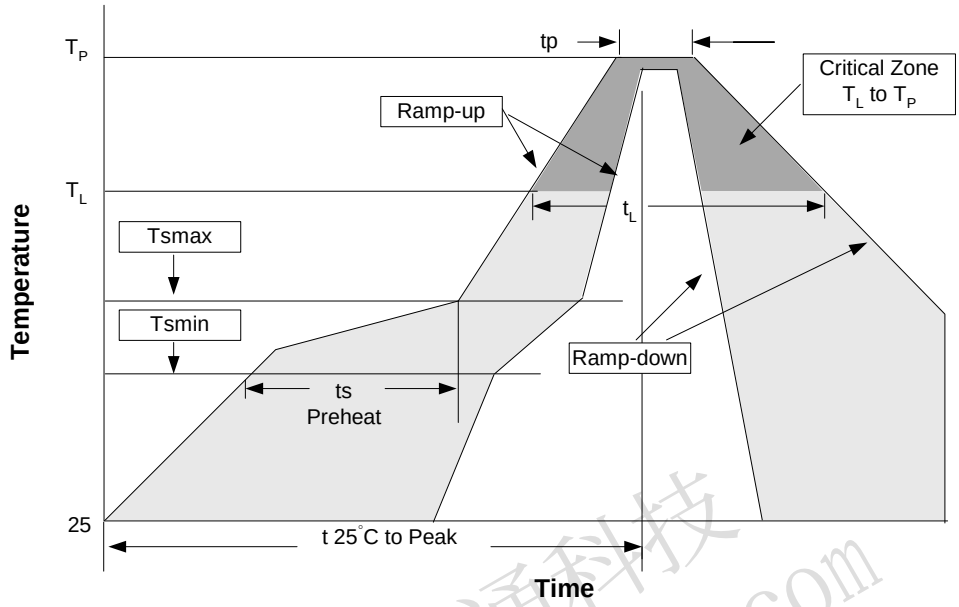
Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.00	1.30	0.039	0.051
A1	0.00	0.10	0.000	0.004
B	0.35	0.51	0.014	0.020
C	0.10	0.25	0.004	0.010
D	2.70	3.10	0.106	0.122
E	1.40	1.80	0.055	0.071
e1	1.90 TYP		0.075 TYP.	
H	2.40	3.00	0.094	0.118
L	0.37		0.015	

Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb,100%Sn).
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

Reflow Condition

(IR/Convection or VPR Reflow)



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly		Pb-Free Assembly	
	Large Body	Small Body	Large Body	Small Body
Average ramp-up rate (T_L to T_P)	3°C/second max.		3°C/second max.	
Preheat - Temperature Min (Tsmin) - Temperature Max (Tsmax) - Time (min to max) (ts)	100°C 150°C 60-120 seconds		150°C 200°C 60-180 seconds	
Tsmax to T_L - Ramp-up Rate			3°C/second max	
Time maintained above: - Temperature (T_L) - Time (t_L)	183°C 60-150 seconds		217°C 60-150 seconds	
Peak Temperature (Tp)	225 +0/-5°C	240 +0/-5°C	245 +0/-5°C	250 +0/-5°C
Time within 5°C of actual Peak Temperature (tp)	10-30 seconds	10-30 seconds	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.	

Notes: All temperatures refer to topside of the package .Measured on the body surface.

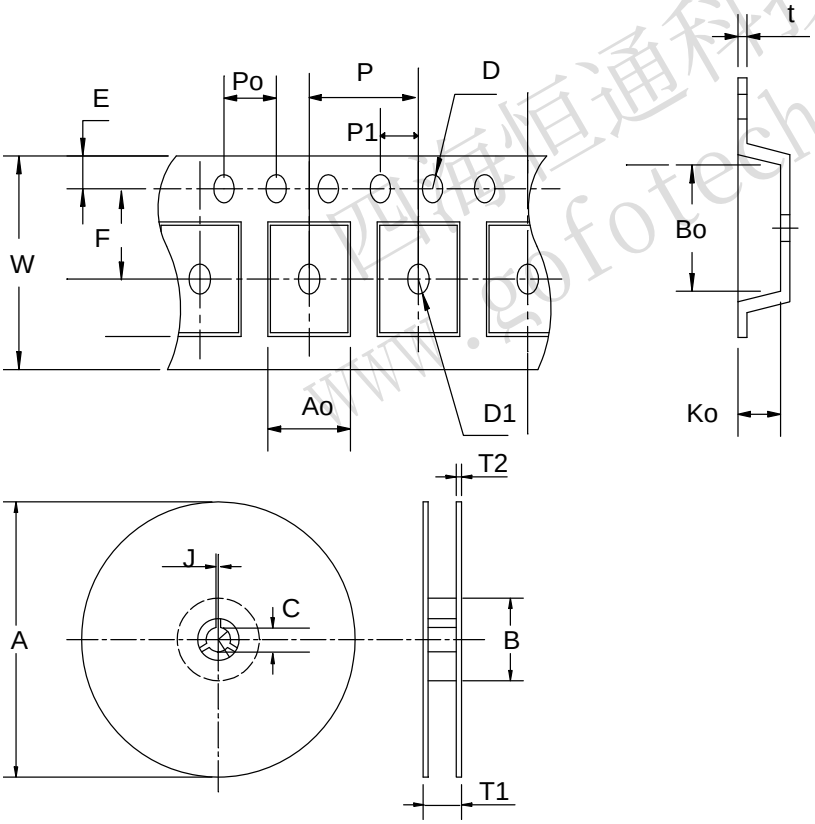
Package Reflow Conditions

pkg. thickness ≥ 2.5mm and all bags	pkg. thickness < 2.5mm and pkg. volume ≥ 350mm^3	pkg. thickness < 2.5mm and pkg. volume < 350mm^3
Convection 220 +5/-0°C		Convection 235 +5/-0°C
VPR 215-219°C		VPR 235 +5/-0°C
IR/Convection 220 +5/-0°C		IR/Convection 220 +5/-0°C

Reliability test program

Test Item	Method	Description
SOLDERABILITY	MIL-STD-883D-2003	245°C,5 SEC
HOLT	MIL-STD 883D-1005.7	1000 Hrs Bias @125°C
PCT	JESD-22-B, A102	168 Hrs, 100% RH, 121°C
TST	MIL-STD 883D-1011.9	-65°C ~ 150°C, 200 Cycles

Carrier Tape & Reel Dimensions



Application	A	B	C	J	T1	T2	W	P	E
SOT- 23	178±1	60 ± 1.0	12.0	2.5 ± 0.15	9.0 ± 0.5	1.4	8.0+ 0.3 - 0.3	4.0	1.75
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	3.5 ± 0.05	1.5 +0.1	φ 0.1MIN	4.0	2.0 ± 0.05	3.1	3.0	1.3	0.2±0.03

(mm)

Cover Tape Dimensions

Application	Carrier Width	Cover Tape Width	Devices Per Reel
SOT-23	8	5.3	3000