

### Features

Advanced trench cell design.  
High speed switch.  
G-S ESD Protected:  $\pm 2000V$   
Pb-Free Package is available.  
We declare that the material of product compliance with  
RoHS requirements and Halogen Free.

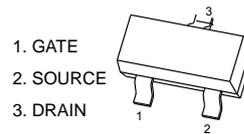
$V_{DSS}$  -60 V  
 $I_D$  -170 mA  
 $R_{DS(ON)}$  4.8  $\Omega$

PD \*

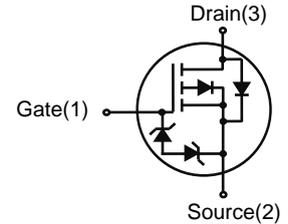
### Applications

Portable appliances.  
Load switch appliances.

#### SOT-23



#### Equivalent Circuit



## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

### MAXIMUM RATINGS

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	$V_{DSS}$	-60	V
Gate-to-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current			mA
- Continuous $T_A = 25^\circ C$	$I_D$	-170	
- Pulsed ( $t_p \leq 10\mu s$ )	$I_{DM}$	-520	

### THERMAL CHARACTERISTICS

Parameter	Symbol	Limits	Unit
Total Device Dissipation, FR-5 Board (Note 1) @ $T_A = 25^\circ C$ Derate above $25^\circ C$	PD	225	mW
Thermal Resistance, Junction-to-Ambient(Note 1)	$R_{\theta JA}$	556	$^\circ C/W$
Junction and Storage temperature	$T_J, T_{stg}$	$-55 \sim +150$	$^\circ C$
Maximum Lead Temperature for Soldering Purposes, for 10 seconds	TL	260	$^\circ C$

1. FR-5 = 1.0x0.75x0.062 in.

**Electrical Characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)**
**OFF CHARACTERISTICS**

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage ( $V_{GS} = 0, I_D = -250\mu\text{A}$ )	VBRDSS	-60	-	-	V
Zero Gate Voltage Drain Current ( $V_{GS} = 0, V_{DS} = -25\text{V}$ ) ( $V_{GS} = 0, V_{DS} = -60\text{V}$ )	IDSS	-	-	-0.1 -15	$\mu\text{A}$
Gate-Body Leakage Current, Forward ( $V_{GS} = 20\text{V}$ )	IGSSF	-	-	10	$\mu\text{A}$
Gate-Body Leakage Current, Reverse ( $V_{GS} = -20\text{V}$ )	IGSSR	-	-	-10	$\mu\text{A}$

**ON CHARACTERISTICS (Note 2)**

Gate Threshold Voltage ( $V_{DS} = V_{GS}, I_D = -250\mu\text{A}$ )	$V_{GS(th)}$	-1.0	-	-2.2	V
Static Drain-Source On-State Resistance ( $V_{GS} = -4.5\text{V}, I_D = -100\text{mA}$ ) ( $V_{GS} = -10\text{V}, I_D = -100\text{mA}$ )	RDS(on)	-	4.8 4	6.2 5.5	$\Omega$
Transfer Admittance ( $V_{DS} = -25\text{V}, I_D = -100\text{mA}, f = 1.0\text{kHz}$ )	$ y_{fs} $	50	-	-	mS

**DYNAMIC CHARACTERISTICS**

Input Capacitance ( $V_{DS} = -25\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$ )	Ciss	-	28.6	-	pF
Output Capacitance ( $V_{DS} = -25\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$ )	Coss	-	4	-	pF
Reverse Transfer Capacitance ( $V_{DS} = -25\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$ )	Crss	-	2.45	-	pF
Total Gate Charge	(VDS = -25V, VGS = -4.5V, ID = -0.1A)	Qg	-	1.1	nC
Gate-Source Charge		Qgs	-	0.3	
Gate-Drain Charge		Qgd	-	0.2	

**SWITCHING CHARACTERISTICS**

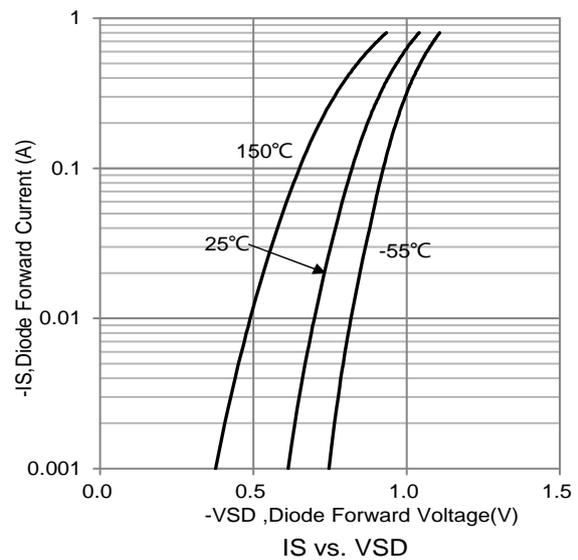
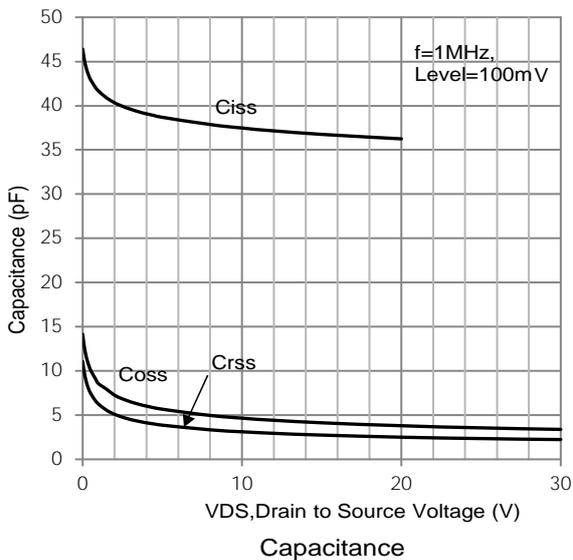
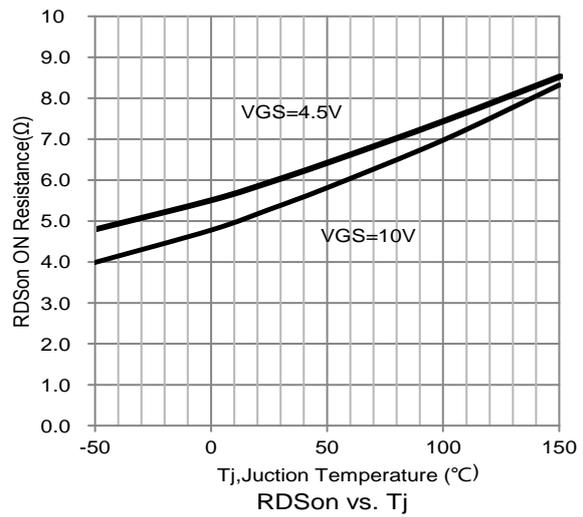
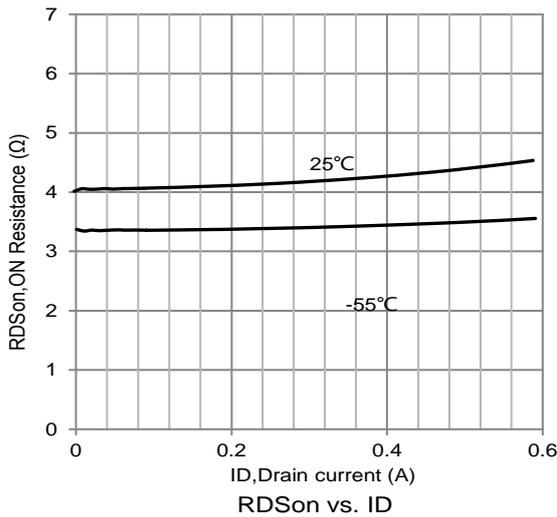
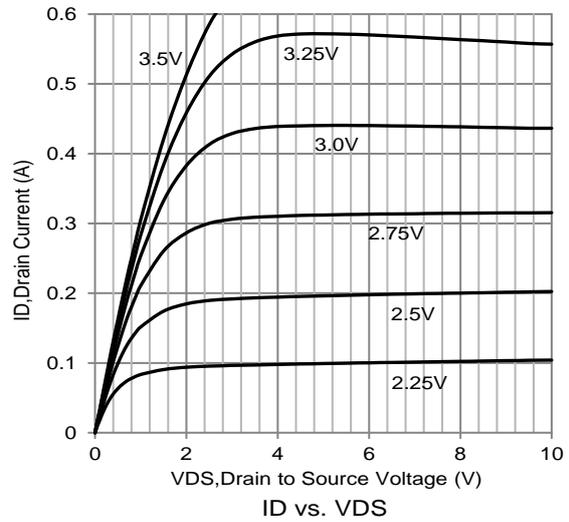
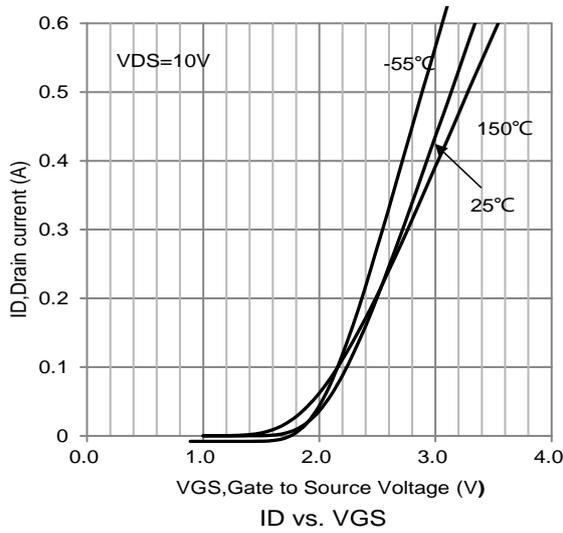
Turn-On Delay Time	(VDS = -25V, VGEN = -10V, IDS = -0.1A, RL = 250 $\Omega$ , RG=6 $\Omega$ )	td(on)	-	4.8	-	ns
Rise Time		tr	-	19	-	
Turn-Off Delay Time		td(off)	-	52	-	
Fall Time		tf	-	32	-	

**SOURCE-DRAIN DIODE CHARACTERISTICS**

Continuous Current	IS	-	-	-0.17	A
Pulsed Current	ISM	-	-	-0.52	A
Forward Voltage	VSD	-	-2.2	-	V

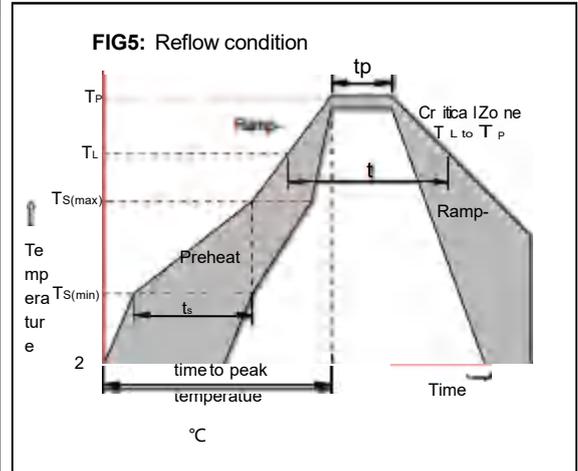
2. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

RATING AND CHARACTERISTIC CURVES



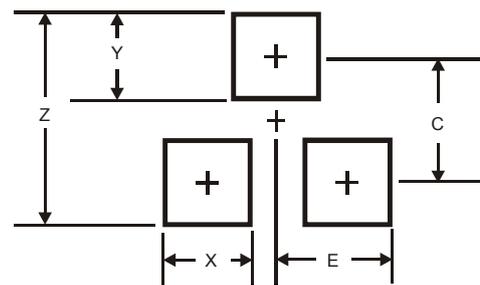
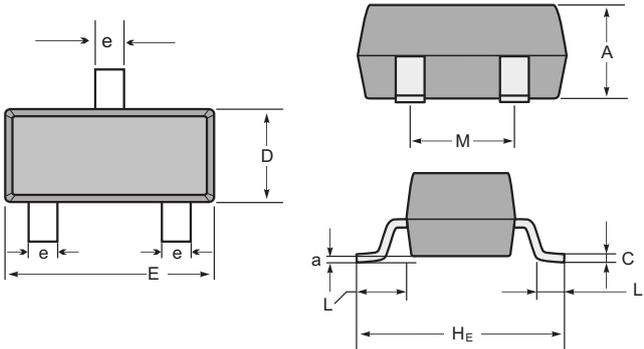
Soldering parameters

Reflow Condition		Pb-Free assembly (see as below)
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	+150°C
	-Temperature Max( $T_{s(max)}$ )	+200°C
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak)		3°C/sec. Max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature( $T_L$ )(Liquid us)	+217°C
	-Temperature( $t_L$ )	60-150 secs.
Peak Temp ( $T_P$ )		+260(+0/-5)°C
Time within 5°C of actual Peak Temp ( $t_p$ )		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp ( $T_P$ )		8 min. Max
Do not exceed		+260°C



Package Dimensions & Suggested Pad Layout

SOT23



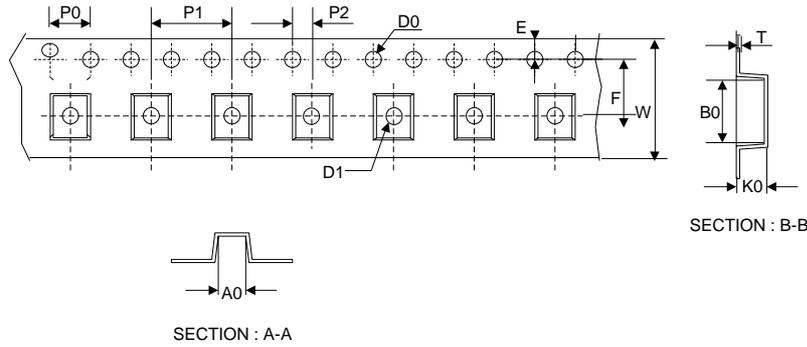
SOT-23 mechanical data

UNIT	A	C	D	E	He	e	M	L	L1	a	
mm	max	1.1	0.15	1.4	3.0	2.6	0.5	1.95	0.55 (ref)	0.36 (ref)	0.0
	min	0.9	0.08	1.2	2.8	2.2	0.3	1.7			0.15
mil	max	43	6	55	118	102	20	77	22 (ref)	14 (ref)	0.0
	min	35	3	47	110	87	12	67			6

Dimensions	SOT23
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

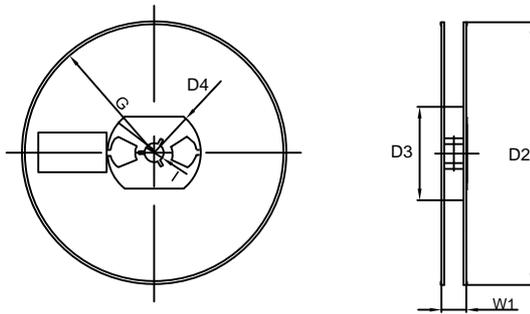
Tape & reel specification

Tape



Symbol	Dimension (mm)
P0	4.00±0.10
P1	4.00±0.10
P2	2.00±0.10
D0	1.55±0.10
D1	1.05±0.10
E	1.55±0.10
F	3.60±0.10
W	8.00±0.10
A0	3.80±0.20
B0	3.25±0.20
K0	1.45±0.10
T	0.25±0.05
D2	178.0±3.0
D3	55Min.
D4	R24.0±3.0
G	R82.0±3.0
I	13.0±2.0
W1	11.0±3.0

7" Reel



Quantity: 3000PCS