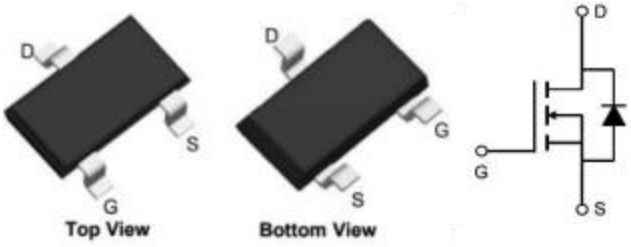
N-Channel Enhancement Mode

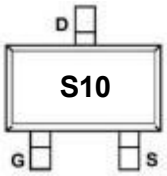
Features

- Advanced Trench Process Technology
- Low Threshold Voltage
- Fast Switching Speed
- Halogen-Free & Lead-Free



Application

- Load Switch for Portable Devices
- Voltage controlled small signal switch



SOT-23
Marking: S10

Absolute Maximum Ratings (at T_a = 25℃ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	3	A
Peak Drain Current, Pulsed [1]	I_{DM}	10	A
Power Dissipation [2]	P_{tot}	1.25	W
Operating Junction	T_J	-55~150	℃
Storage Temperature Range	T_{stg}	-55~150	℃

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient [2]	$R_{\theta JA}$	100	℃/W

Note:

1) Pulse width ≤100us, duty cycle ≤1%, limited by Tjmax.

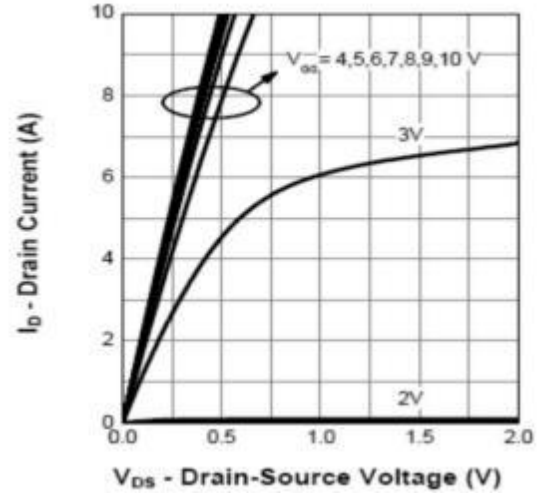
2) Device mounted on FR-4 substrate PC board, 2ozcopper, with 1-inch square copper plate in still air.

Characteristics at T_a = 25℃ unless otherwise specified

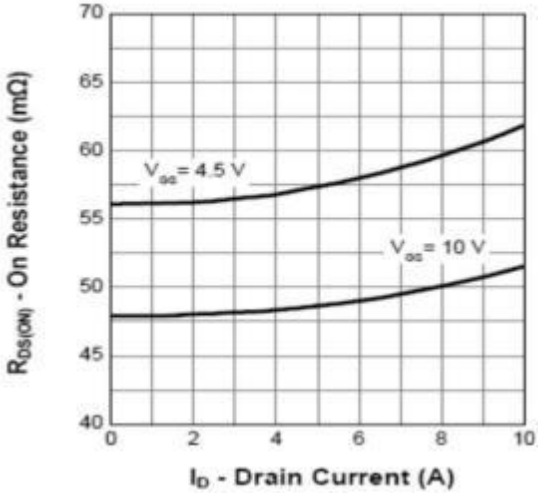
Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at V_{GS}=0V, I_D=250μA	BV_{DSS}	60			V
Drain-Source Leakage Current at V_{DS} =60V, V_{GS} =0V	I_{DSS}			1	uA
Gate Leakage Current at V_{DS} =0V, V_{GS} = ±20	I_{GSS}			±100	nA
Gate-Source Threshold Voltage at V_{DS} = V_{GS}, I_D = 250 μA	$V_{GS(th)}$	1		2.2	V
Drain-Source On-State Resistance at V_{GS} = 10 V, I_D = =3A at V_{GS} =4. 5V, I_D =3A	$R_{DS(on)}$		75 90	90 110	mΩ
DYNAMIC PARAMETERS					
Forward Transconductance at V_{DS} =5V, I_D =3A	g_{fs}		6		S
Input Capacitance at V_{DS}=30V, V_{GS}=0V, f=1MHz	C_{iss}		410		pF
Output Capacitance at V_{DS}=30V, V_{GS}=0V, f=1MHz	C_{oss}		35		pF
Reverse Transfer Capacitance at V_{DS}=30V, V_{GS}=0V, f=1MHz	Crss		32		pF
Gate charge total at V_{DS} = 30 V, I_D = 3 A, V_{GS} = 10 V at V_{DS} = 30 V, I_D = 3 A, V_{GS} = 4.5 V	Qg		12 5.9		nC
Gate to Source Charge at V_{GS}=10V, V_{DS}=30V, I_D=3A	Qgs		2.8		nC
Gate to Drain Charge at V_{GS}=10V, V_{DS}=30V, I_D=3A	Q_{gd}		1.6		nC
Turn-On Delay Time at V_{DS}=30V, I_D = 3A, V_{GS}=10V, R_G=4.5Ω	$t_{d(on)}$		10		nS
Turn-On Rise Time at V_{DS}=30V, I_D = 3A, V_{GS}=10V, R_G=4.5Ω	tr		23		nS
Turn-Off Delay Time at V_{DS}=30V, I_D = 3A, V_{GS}=10V, R_G=4.5Ω	td(off)		34		nS
Tum-Off Delay Time at V_{DS}=30V, I_D = 3A, V_{GS}=10V, R_G=4.5Ω	t_f		4.6		nS
Gate resistance at V_{DS} = 0 V, V_{GS}=0V, f = 1 MHz	Rg		15		Ω
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at I_S =3A, V_{GS} = 0 V	V_{SD}			1	V
Body Diode Reverse Recovery Time at I_S = 3 A, di/dt = 100 A / μs	trr		34		nS
Body Diode Reverse Recovery Charge at I_S = 3 A, di/dt = 100 A / μs	Qrr		4.6		nC

Electrical Characteristics Curves

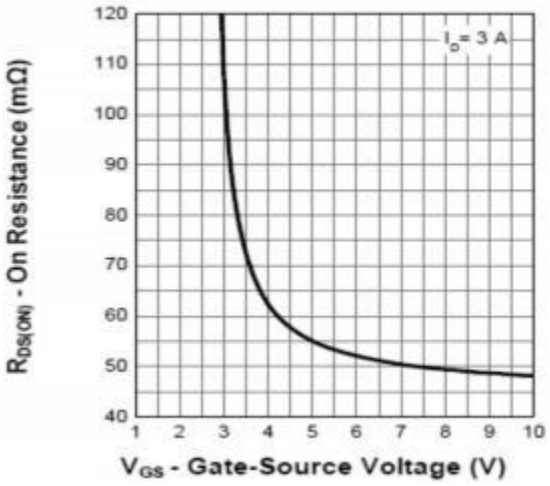
Output Characteristics



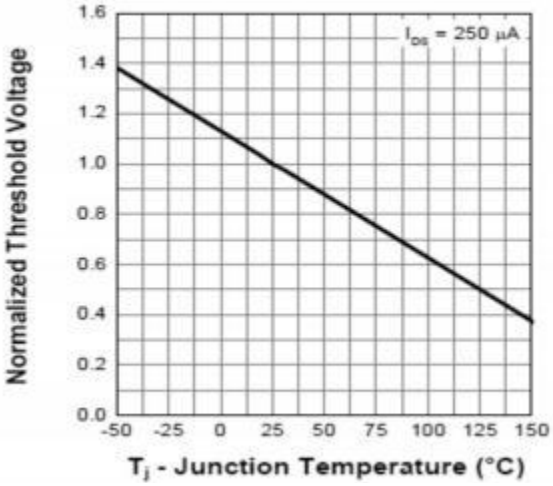
On Resistance



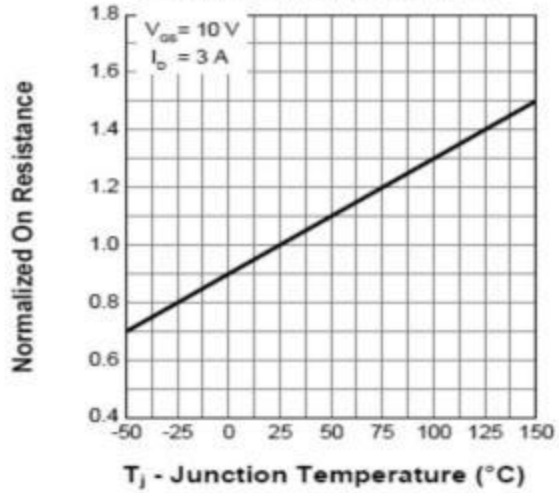
Transfer Characteristics



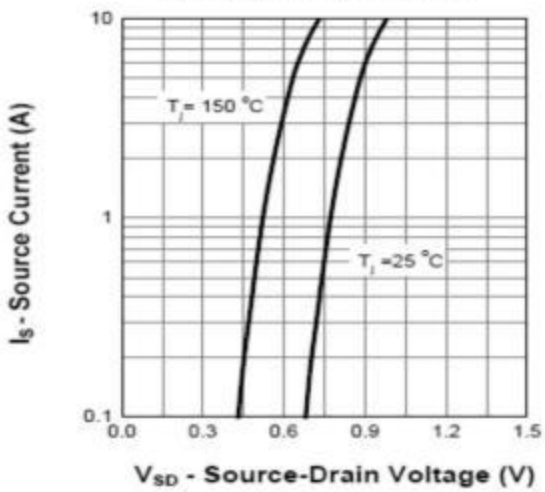
Normalized Threshold Voltage



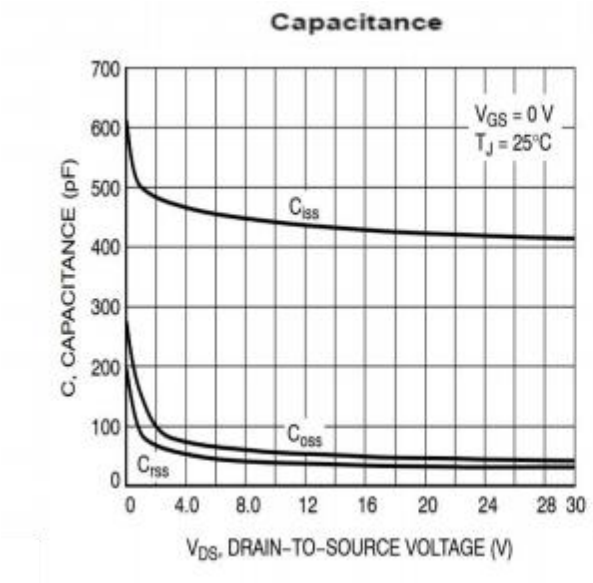
Normalized On Resistance

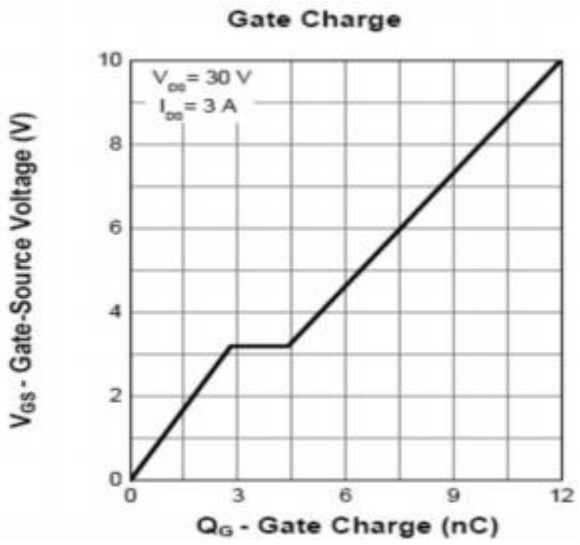


Diode Forward Current



Electrical Characteristics Curves





Test Circuits

Fig.1-1 Switching times test circuit

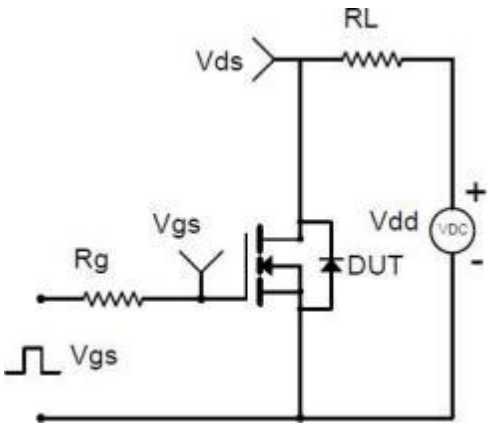


Fig.1-2 Switching Waveform

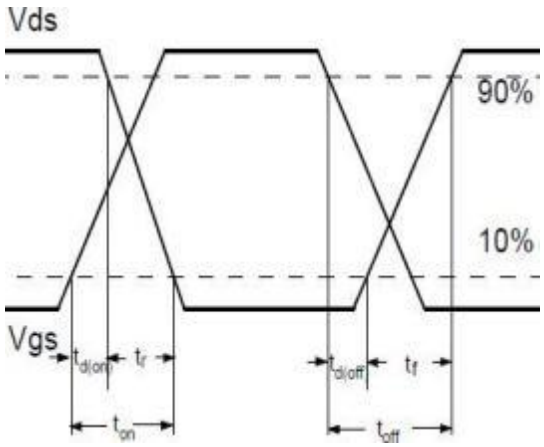


Fig.2-1 Gate charge test circuit

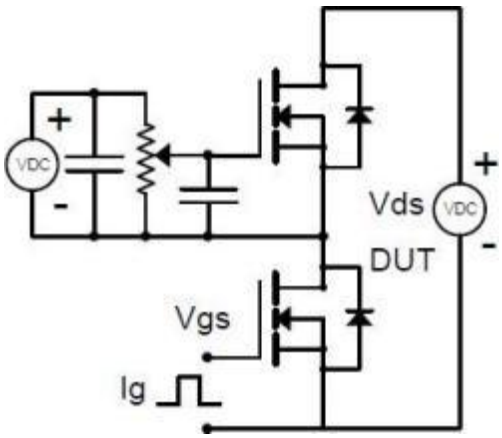


Fig.2-2 Gate charge waveform

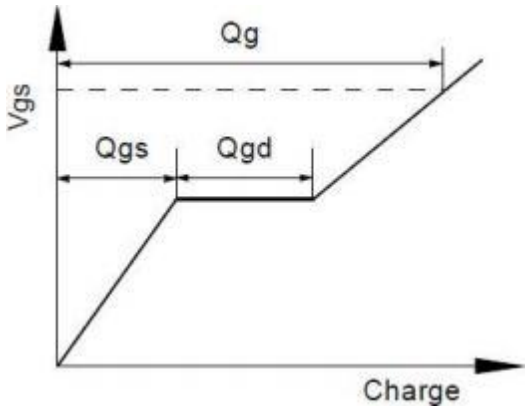


Fig.3-1 Avalanche test circuit

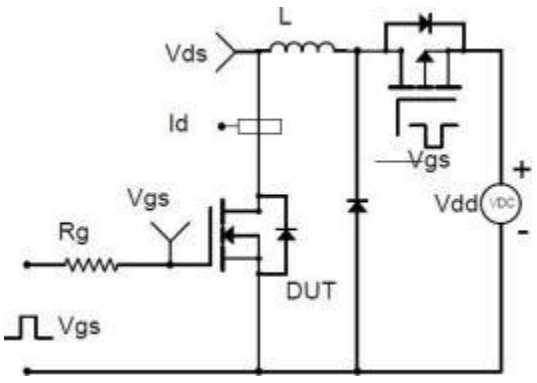
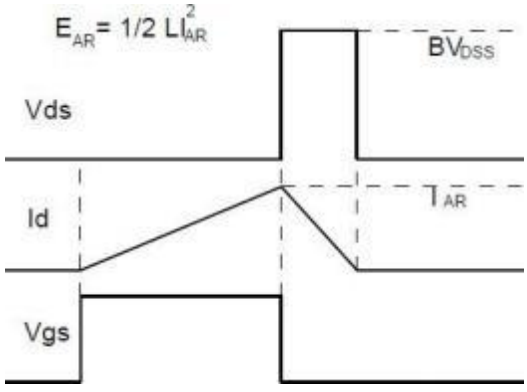
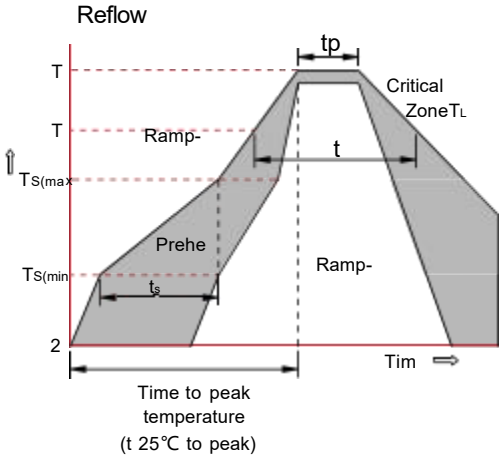


Fig.3-2 Avalanche waveform



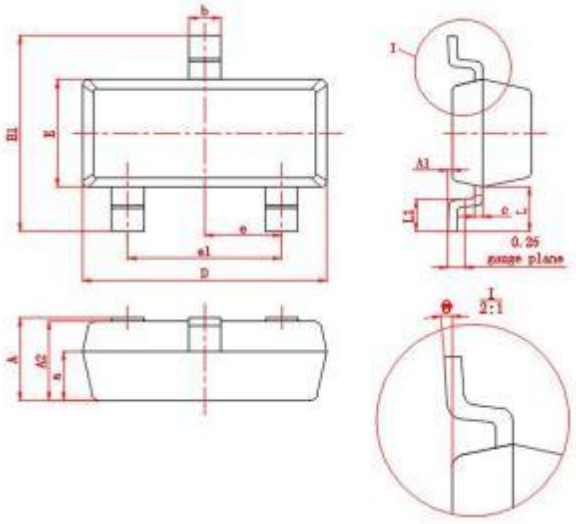
Soldering parameters

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



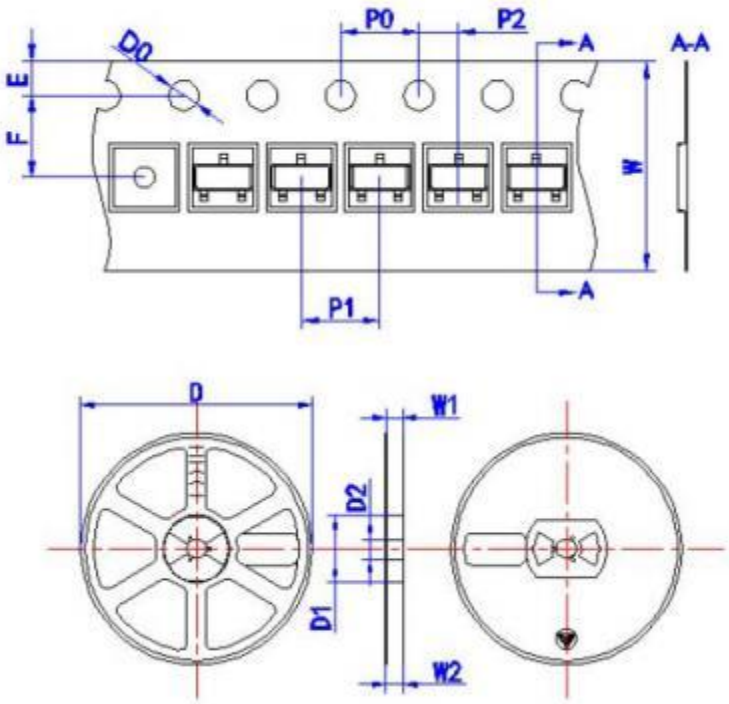
Package Outline Dimensions (Units: mm)

SOT-23



符号	尺寸		符号	尺寸		符号	尺寸	
	Min	Max		Min	Max		Min	Max
A	0.9	1.15	**E**	1.2	1.4	**c**	0.08	0.15
A1	0	0.1	**E1**	2.25	2.55	**L**	(0.55)	
A2	0.9	1.05	**e**	(0.95)		**L1**	0.3	0.5
a	(0.6)		**e1**	1.8	2.0	**θ**	0°	8°
D	2.8	3.0	**b**	0.3	0.5			

Emboss Carrier Tape&Reel



Symbol	Dimension in Millimeters
Tape	
D0	1.50+0.10/-0.00
E	1.75±0.10
F	3.50±0.10
P0	4.00±0.10
P1	4.00±0.10
P2	2.00±0.10
W	8.00+0.3/-0.1
Reel	
D	178.0±2.00
D1	54.40±1.00
D2	13.00±1.00
W1	9.50±1.00
W2	12.30±1.00