

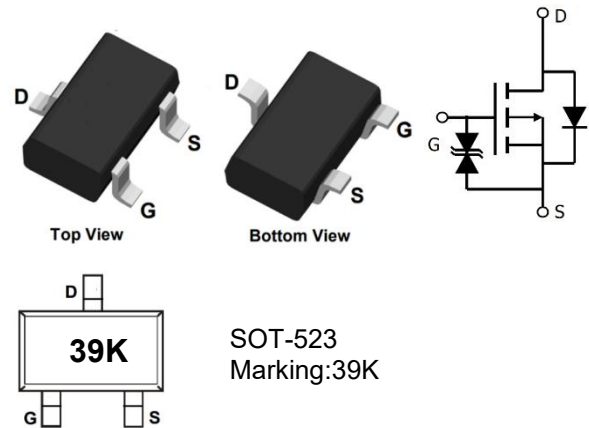
P-Channel Enhancement Mode MOSFET

Features

- Advanced Trench Process Technology
- Low Threshold Voltage
- Fast Switching Speed
- Halogen-Free & Lead-Free
- Operated at Low Logic Level Gate Drive
- P-Channel Switch with Low $R_{DS(on)}$

Application

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



Absolute Maximum Ratings (at $T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current	I_D	-0.7	A
Peak Drain Current, Pulsed ¹⁾	I_{DM}	-1.2	A
Power Dissipation	P_{tot}	0.19	W
Operating Junction	T_J	-55~150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55~150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient ²⁾	$R_{\theta JA}$	650	$^\circ\text{C/W}$

Note:

¹⁾ Pulse width $\leq 100\mu\text{s}$, duty cycle $\leq 1\%$, limited by T_{Jmax} .

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

Characteristics at T_a = 25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at I _D = -250 μA	BV _{DSS}	-20			V
Drain-Source Leakage Current at V _{DS} = -20 V, V _{GS} = 0 V	I _{DSS}			-1	μA
Gate Leakage Current at V _{GS} = ± 10 V	I _{GSS}			± 10	μA
Gate-Source Threshold Voltage at V _{DS} = V _{GS} , I _D = -250μA	V _{GS(th)}	-0.35	-0.7	-1.1	V
Drain-Source On-State Resistance at V _{GS} = -4.5 V, I _D = -500m A at V _{GS} = -2.5 V, I _D = -300 mA	R _{DS(on)}		350 480	510 775	mΩ
DYNAMIC PARAMETERS					
Forward Transconductance at V _{DS} = -10 V, I _D = -0.54 A	g _{fs}		1.2		S
Input Capacitance at V _{GS} = 0 V, V _{DS} = -16V, f = 1 MHz	C _{iss}		113		pF
Output Capacitance at V _{GS} = 0 V, V _{DS} = -16 V, f = 1 MHz	C _{oss}		15		pF
Reverse Transfer Capacitance at V _{GS} = 0 V, V _{DS} = -16V, f = 1 MHz	C _{rss}		9		pF
Gate charge total at V _{DS} = -10 V, I _D = -0.65 A, V _{GS} = -4.5 V	Q _g		1.24		nC
Gate to Source Charge at V _{DS} = -10 V, I _D = -0.65 A, V _{GS} = -4.5 V	Q _{gs}		0.37		nC
Gate to Drain Charge at V _{DS} = -10 V, I _D = -0.65 A, V _{GS} = -4.5 V	Q _{gd}		0.27		nC
Turn-On Delay Time at V _{GS} = -4.5 V, V _{DS} = -10 V, I _D = -0.2 A, R _{gen} = 10 Ω	t _{d(on)}		9		nS
Turn-On Rise Time at V _{GS} = -4.5 V, V _{DS} = -10 V, I _D = -0.2 A, R _{gen} = 10 Ω	t _r		5.8		nS
Turn-Off Delay Time at V _{GS} = -4.5 V, V _{DS} = -10 V, I _D = -0.2 A, R _{gen} = 10 Ω	t _{d(off)}		32.6		nS
Turn-Off Fall Time at V _{GS} = -4.5 V, V _{DS} = -10 V, I _D = -0.2 A, R _{gen} = 10 Ω	t _f		20.3		nS
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at I _S = -0.5 A, V _{GS} = 0 V	V _{SD}			-1.2	V
Body Diode Reverse Recovery Time at I _F = -1.25 A, di/dt = 100 A / μs	t _{rr}			10.2	nS
Body Diode Reverse Recovery Charge at I _F = -1.25A, di/dt = 100 A / μs	Q _{rr}			3.5	nC

Electrical Characteristics Curves

Fig. 1 - Output Characteristics

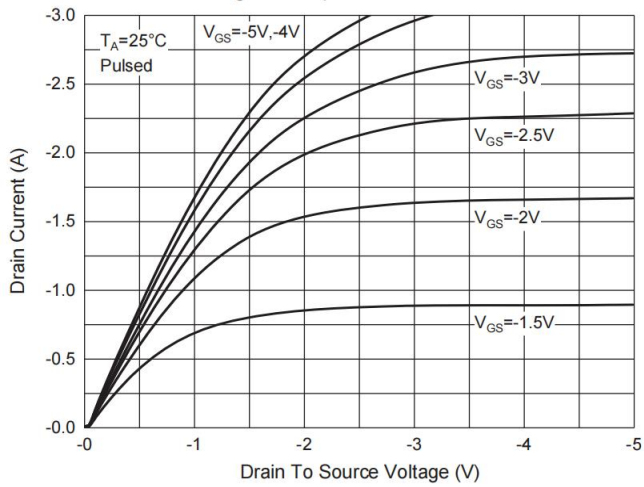


Fig. 2 - Transfer Characteristics

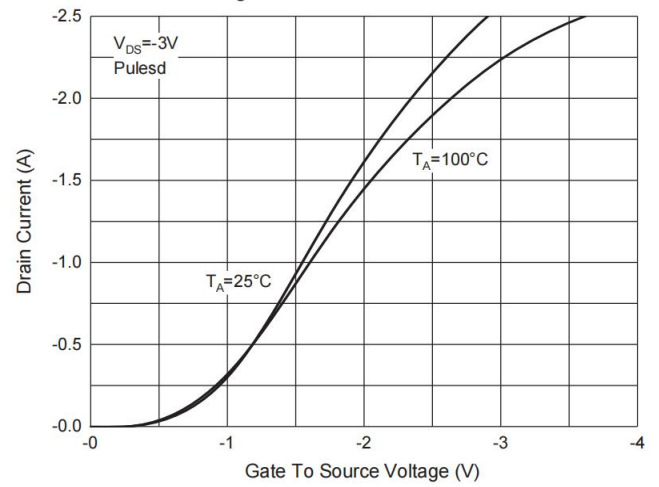


Fig. 3 - $R_{DS(ON)} - I_D$

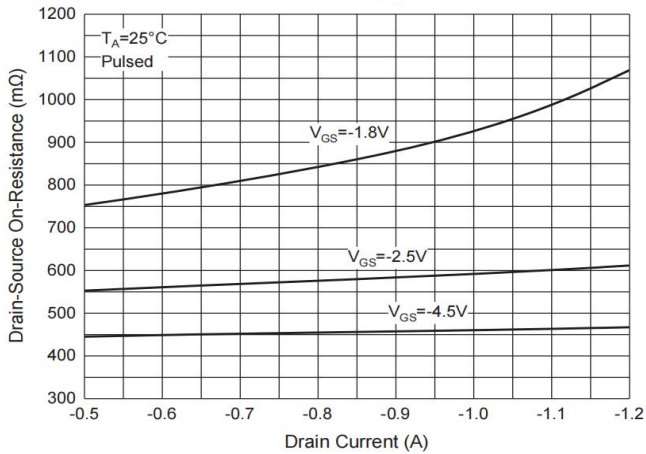


Fig. 4 - $R_{DS(ON)} - V_{GS}$

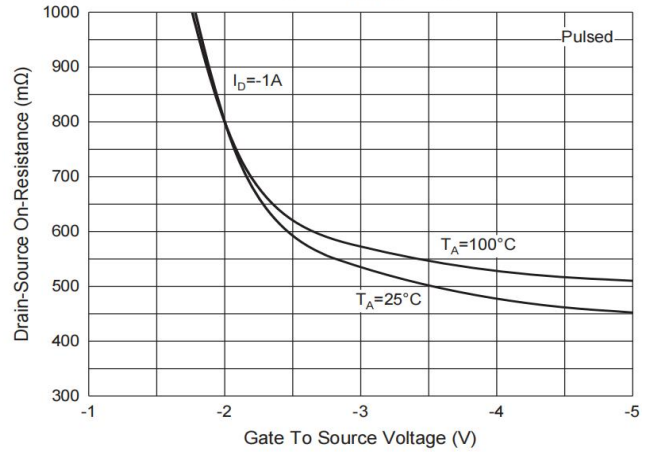


Fig. 5 - $I_S - V_{SD}$

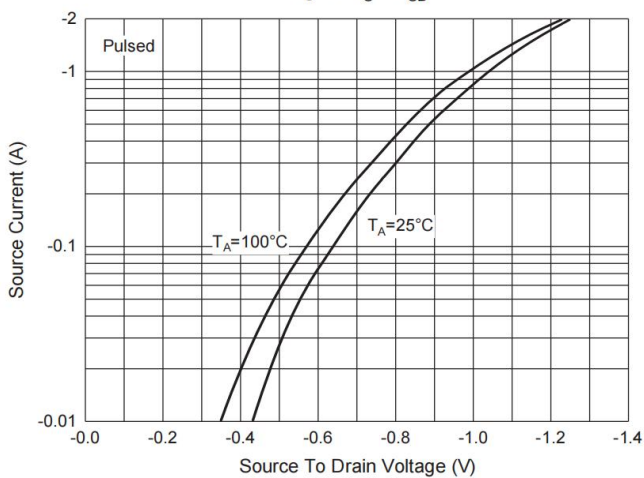
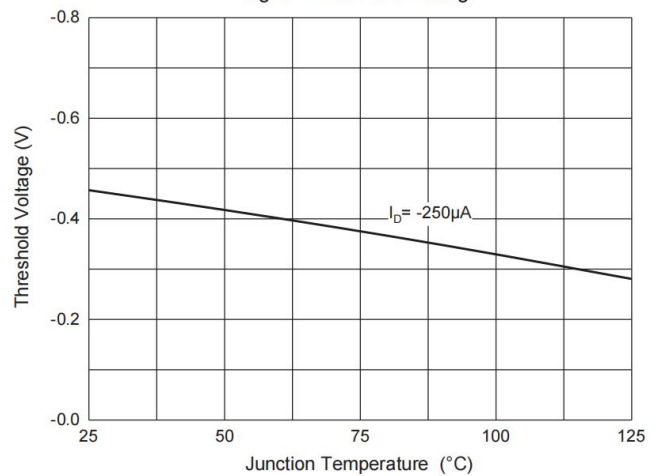


Fig. 6 - Threshold Voltage



Test Circuits

Fig.1-1 Switching times test circuit

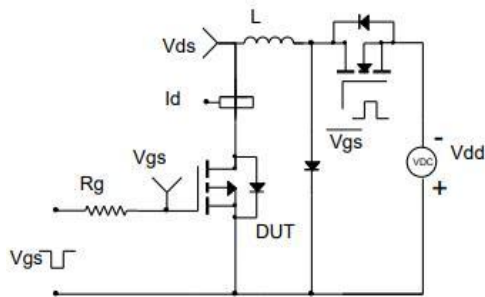


Fig.1-2 Switching Waveform

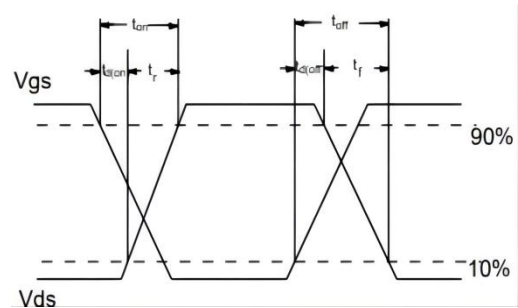


Fig.2-1 Gate charge test circuit

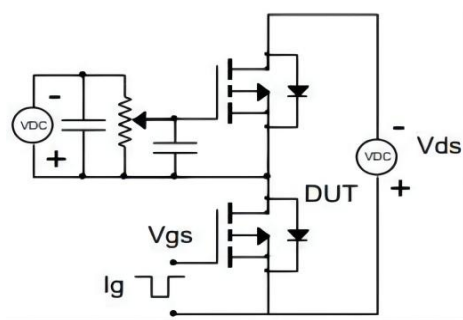


Fig.2-2 Gate charge waveform

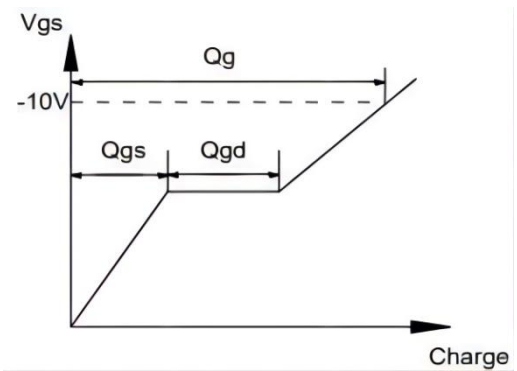


Fig.3-1 Avalanche test circuit

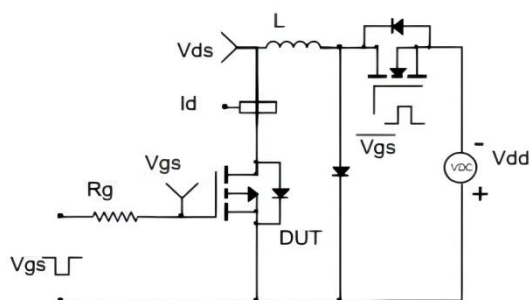
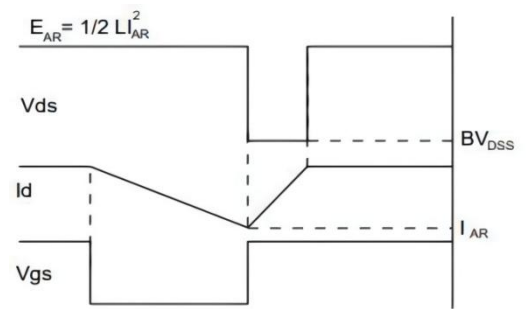
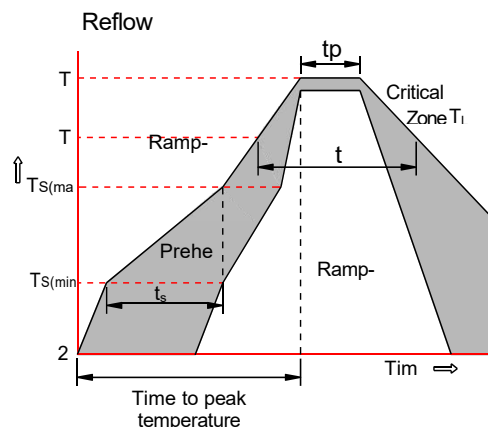


Fig.3-2 Avalanche waveform



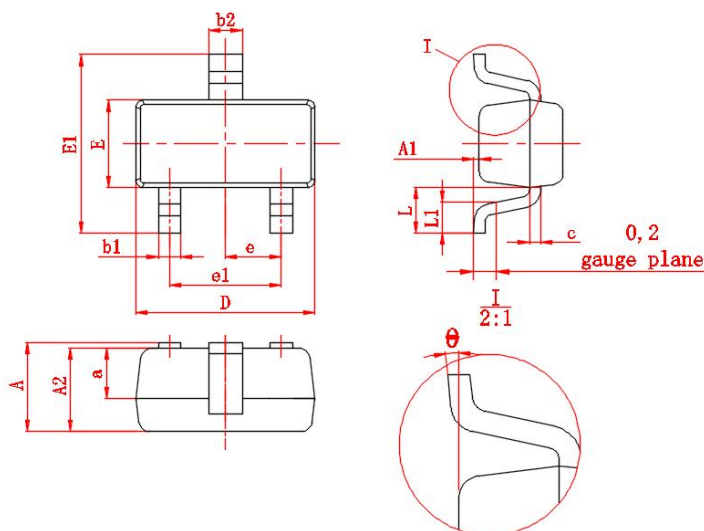
Soldering parameters

Reflow Condition		Pb-Free assembly (see as 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 Outline Dimensions (Units: mm)

SOT-523



符号	尺寸		符号	尺寸		符号	尺寸	
	Min	Max		Min	Max		Min	Max
A	0.7	0.9	E	0.7	0.9	b2	0.25	0.35
A1	0	0.1	E1	1.45	1.75	c	0.08	0.15
A2	0.7	0.8	e	(0.5)		L	(0.4)	
a	(0.45)		e1	0.9	1.1	L1	0.2	0.4
D	1.5	1.7	b1	0.15	0.25	θ	0°	8°