

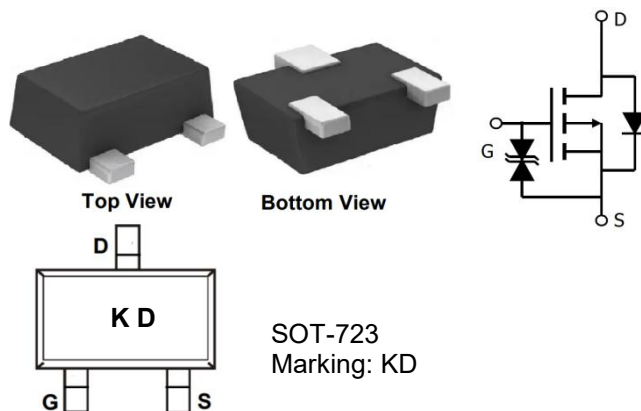
P-Channel Enhancement Mode MOSFET

Features

- Advanced Trench Process Technology
- Low Threshold Voltage
- Fast Switching Speed
- Halogen-Free & Lead-Free
- ESD Protected up to 2KV (HBM)

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	-0.66	A
Peak Drain Current, Pulsed ¹⁾	I_{DM}	-1.2	A
Power Dissipation ²⁾	P_{tot}	0.15	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⁾	$R_{\theta JA}$	833	$^\circ\text{C/W}$

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 Ta = 25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $I_D = -250 \mu A$	BV_{DSS}	-20			V
Drain-Source Leakage Current at $V_{DS} = -20 V$	I_{DSS}			-1	μA
Gate Leakage Current at $V_{GS} = \pm 10 V$	I_{GSS}			± 10	μA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $I_D = -250 \mu A$	$V_{GS(th)}$	-0.35		-0.8	V
Drain-Source On-State Resistance at $V_{GS} = -4.5 V$, $I_D = -0.5 A$ at $V_{GS} = -2.5 V$, $I_D = -0.5 A$	$R_{DS(on)}$		350 480	510 775	m Ω
DYNAMIC PARAMETERS					
Forward Transconductance at $V_{DS} = -10 V$, $I_D = -0.54 A$	g_{fs}		1.2		S
Input Capacitance at $V_{GS} = 0 V$, $V_{DS} = -16 V$, $f = 1 MHz$	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 $V_{GS} = 0 V$, $V_{DS} = -16 V$, $f = 1 MHz$	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 $V_{GS} = -4.5 V$, $V_{DS} = -10 V$, $I_D = -0.2 A$, $R_{GEN} = 10 \Omega$	$t_{d(on)}$		9.0		ns
Turn-On Rise Time at $V_{GS} = -4.5 V$, $V_{DS} = -10 V$, $I_D = -0.2 A$, $R_{GEN} = 10 \Omega$	t_r		5.8		ns
Turn-Off Delay Time at $V_{GS} = -4.5 V$, $V_{DS} = -10 V$, $I_D = -0.2 A$, $R_{GEN} = 10 \Omega$	$t_{d(off)}$		32.7		ns
Turn-Off Fall Time at $V_{GS} = -4.5 V$, $V_{DS} = -10 V$, $I_D = -0.2 A$, $R_{GEN} = 10 \Omega$	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 $I_F = -1.25 A$, $di/dt = 100 A / \mu s$	t_{rr}		10.2		ns
Body Diode Reverse Recovery Charge at $I_F = -1.25 A$, $di/dt = 100 A / \mu s$	Q_{rr}		3.5		nC

Electrical Characteristics Curves

Fig. 1 - Output Characteristics

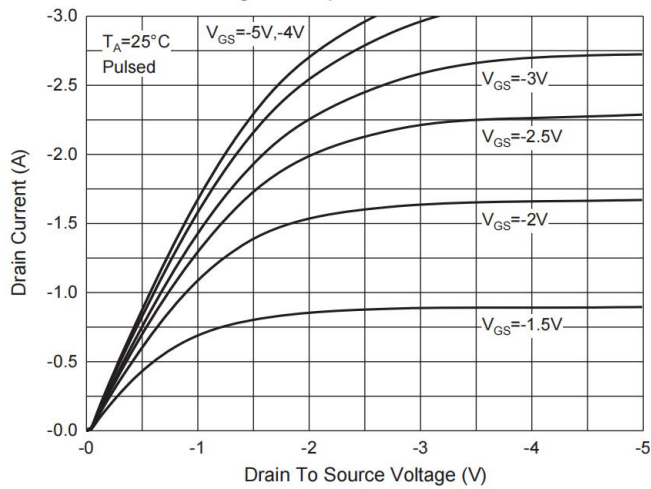


Fig. 2 - Transfer Characteristics

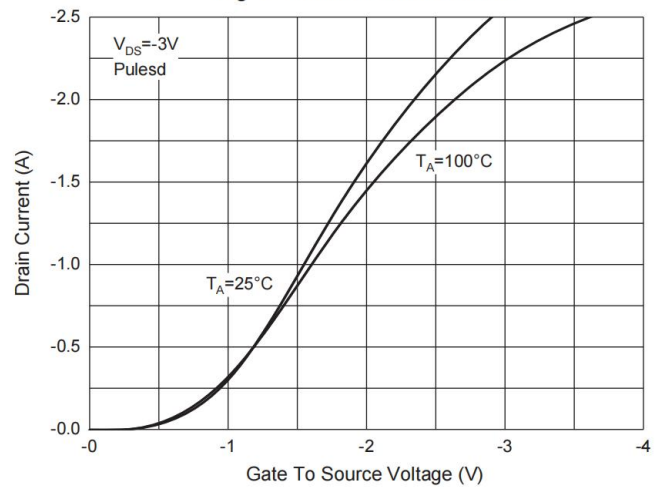


Fig. 3 - $R_{DS(ON)} - I_D$

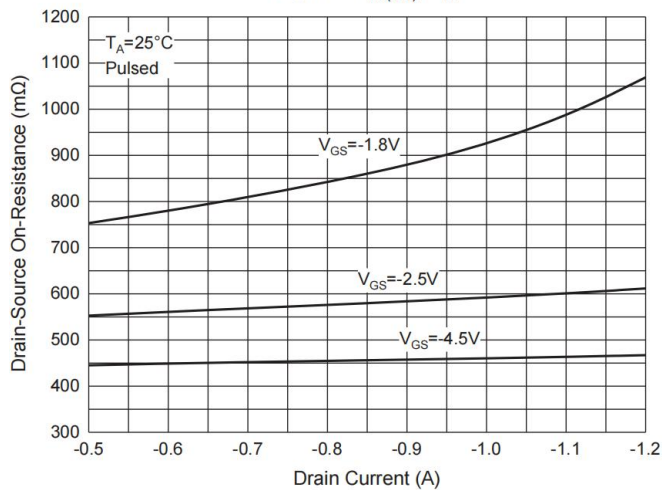


Fig. 4 - $R_{DS(ON)} - V_{GS}$

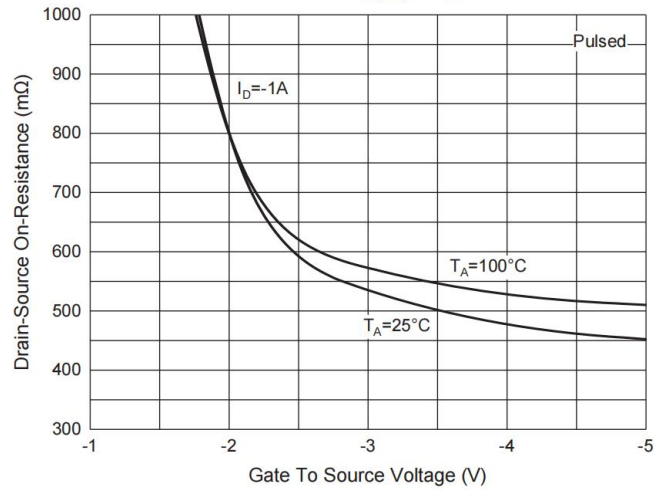


Fig. 3 - $I_S - V_{SD}$

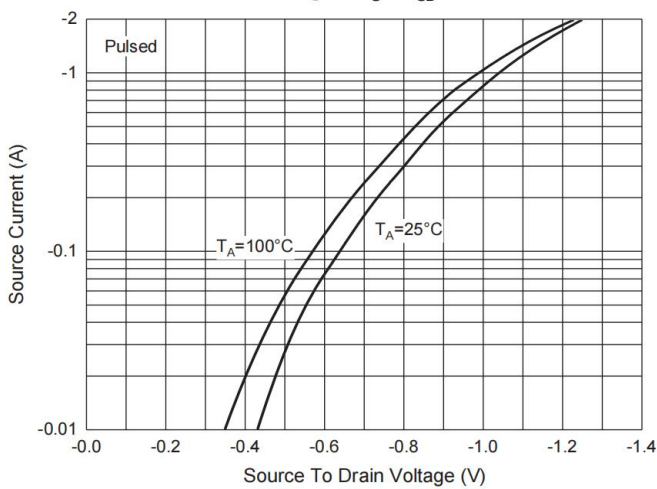
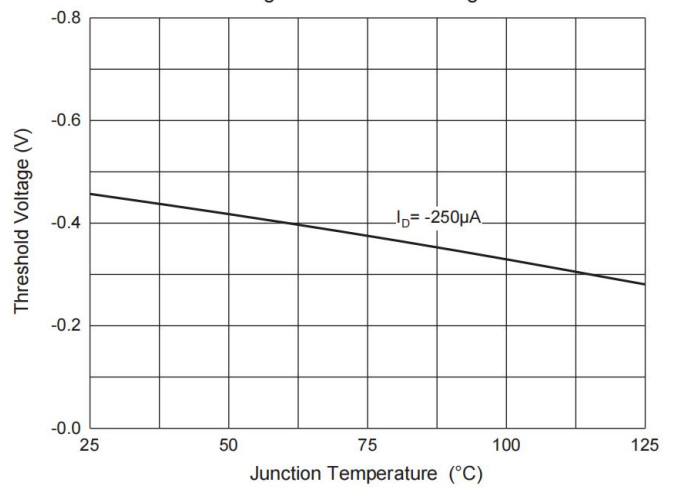


Fig. 6 - Threshold Voltage



Test Circuits

Fig.1-1 Switching times test circuit

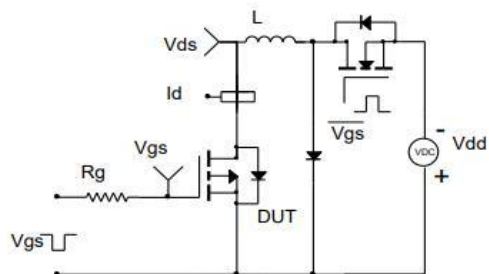


Fig.1-2 Switching Waveform

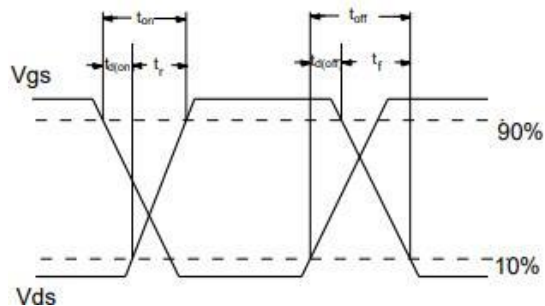


Fig.2-1 Gate charge test circuit

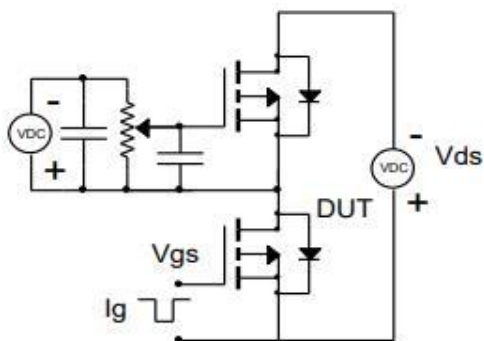


Fig.2-2 Gate charge waveform

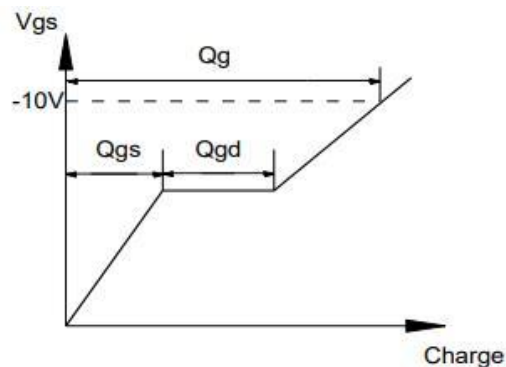


Fig.3-1 Avalanche test circuit

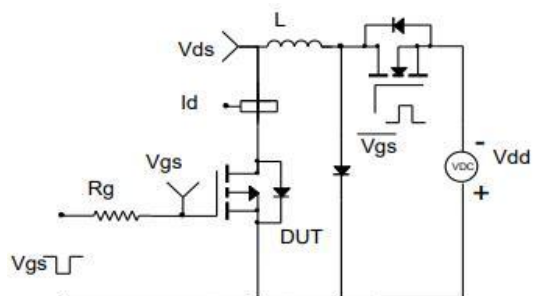
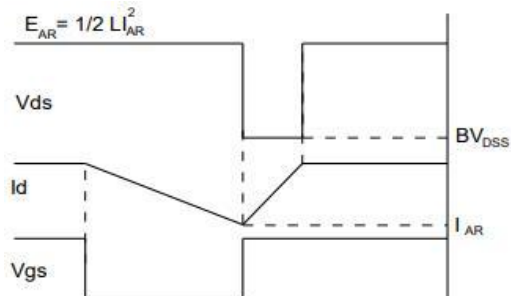
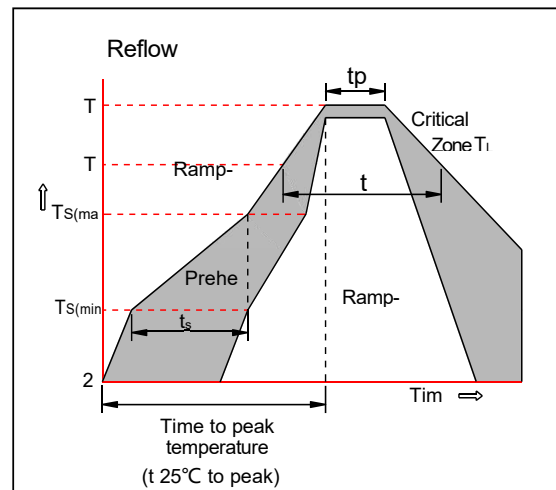


Fig.3-2 Avalanche waveform



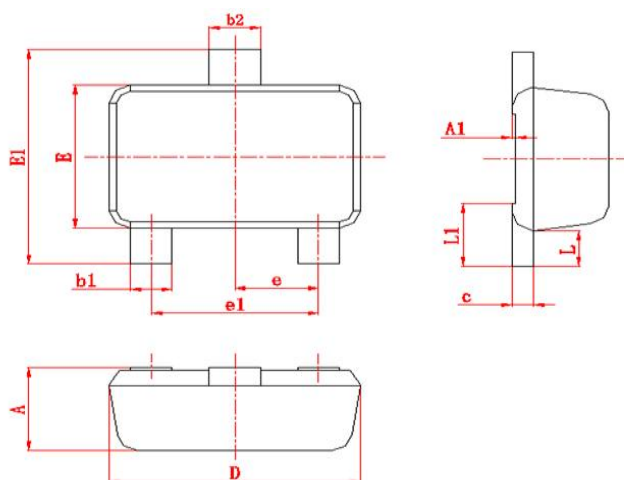
Soldering parameters

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-723



符号	尺寸		符号	尺寸		符号	尺寸	
	Min	Max		Min	Max		Min	Max
A	0.43	0.5	E1	1.15	1.25	b2	0.25	0.35
A1	0	0.05	e	(0.4)		c	0.08	0.15
D	1.15	1.25	e1	0.7	0.9	L	0.15	0.25
E	0.75	0.85	b1	0.15	0.25	L1	(0.3)	