

Plastic-Encapsulate MOSFETS

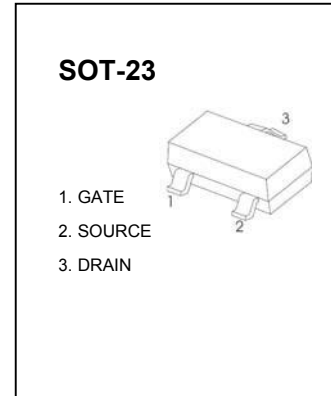
P-Channel 12-V(D-S) MOSFET

FEATURE

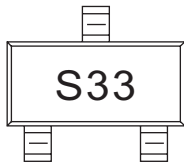
- TrenchFET Power MOSFET
- Excellent $R_{DS(on)}$ and Low Gate Charge

APPLICATION

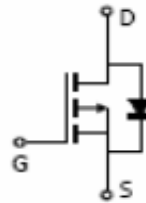
- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch



MARKING: S33



Equivalent Circuit



ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-12	V
Gate-Source Voltage	V_{GS}	± 8	V
Continuous Drain Current	I_D	-6 ^a	A
Pulsed Drain Current ($t=300\mu\text{s}$)	I_{DM}	-20	A
Power Dissipation	P_D	0.35 ^b	W
		1.1 ^a	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	357 ^b	$^\circ\text{C/W}$
		113 ^a	$^\circ\text{C/W}$
Operation Junction and Storage Temperature Range	T_J, T_{STG}	-55~ +150	$^\circ\text{C}$

a. Device mounted on FR-4 substrate board, with minimum recommended pad layout, single side.

b. Device mounted on no heat sink.

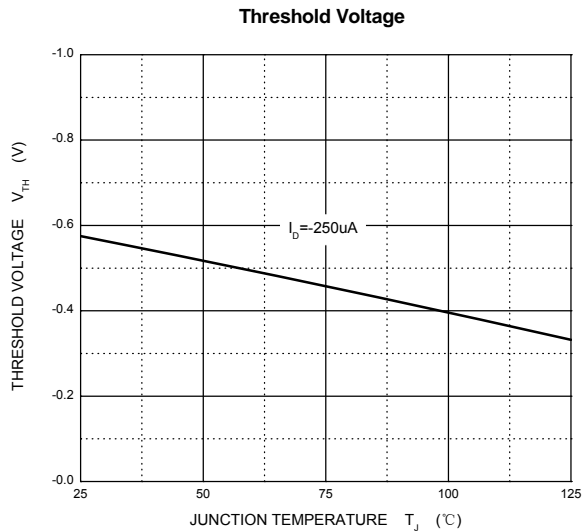
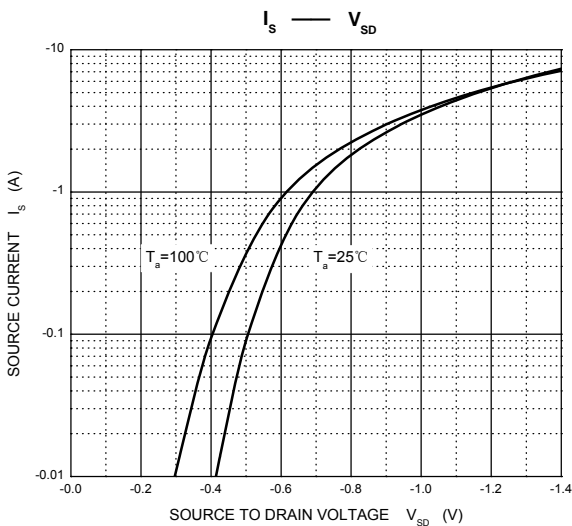
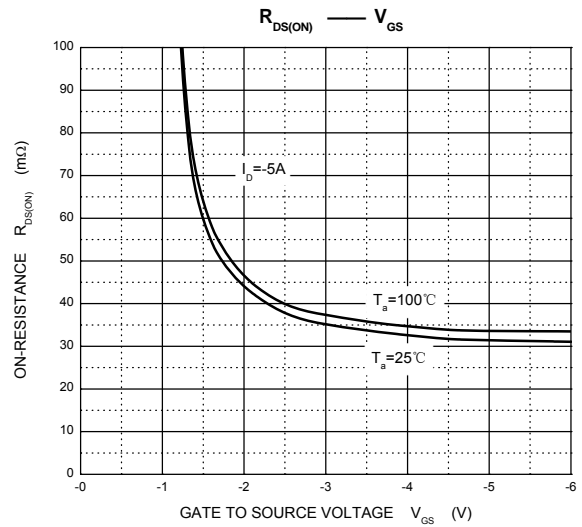
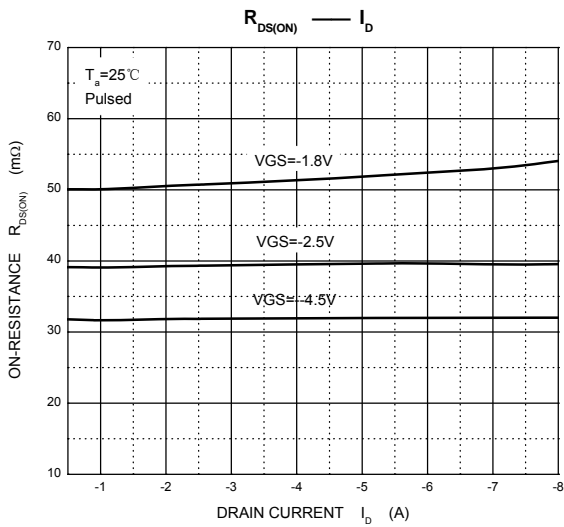
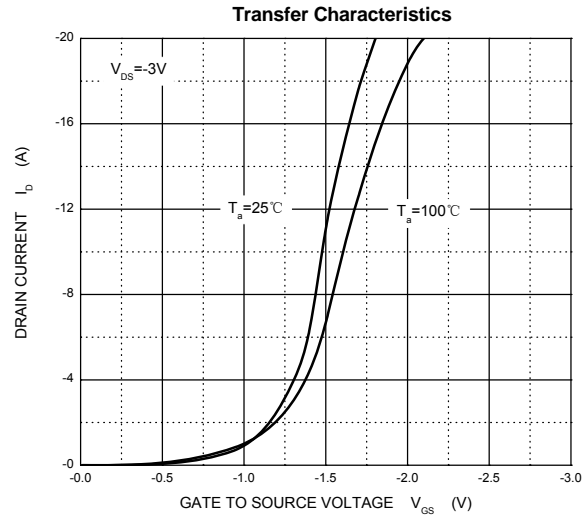
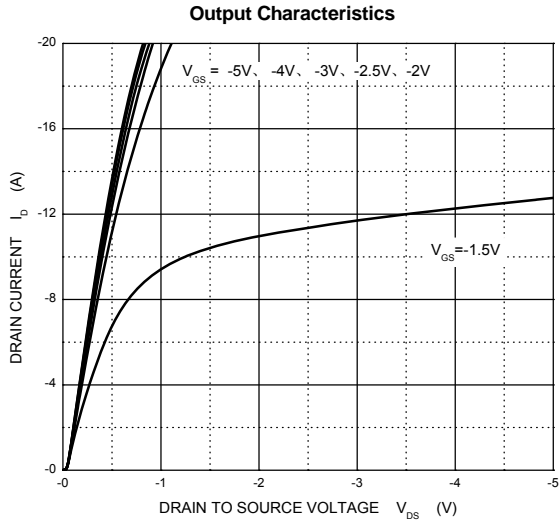
MOSFET ELECTRICAL CHARACTERISTICS

$T_a=25\text{ }^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-12			V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -12V, V_{GS} = 0V$			-1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 8V, V_{DS} = 0V$			± 0.1	μA
Gate threshold voltage (note 1)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.4		-1	V
Drain-source on-resistance (note 1)	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -5A$			35	m Ω
		$V_{GS} = -2.5V, I_D = -4.3A$			45	
		$V_{GS} = -1.8V, I_D = -1A$			63	
Forward transconductance (note 1)	g_{FS}	$V_{DS} = -5V, I_D = -5A$		18		S
Dynamic characteristics (note 2)						
Input Capacitance	C_{iss}	$V_{DS} = -6V, V_{GS} = 0V, f = 1MHz$		1275		pF
Output Capacitance	C_{oss}			255		pF
Reverse Transfer Capacitance	C_{rss}			236		pF
Gate resistance	R_g	$f = 1MHz$	1.9		19	Ω
Total Gate Charge	Q_g	$V_{DS} = -6V, V_{GS} = -4.5V, I_D = -5A$		14	21	nC
Gate-Source Charge	Q_{gs}			2.3		nC
Gate-Drain Charge	Q_{gd}			3.6		nC
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -6V, V_{GEN} = -4.5V, I_D = -4A$ $R_L = 6\Omega, R_{GEN} = 1\Omega$		26	40	ns
Turn-on rise time	t_r			24	40	ns
Turn-off delay time	$t_{d(off)}$			45	70	ns
Turn-off fall time	t_f			20	35	ns
Source-Drain Diode characteristics						
Diode forward current	I_S	$T_C = 25^\circ C$			-1.4	A
Diode pulsed forward current	I_{SM}				-20	A
Diode Forward voltage (note 1)	V_{DS}	$V_{GS} = 0V, I_S = -4A$			-1.2	V
Diode reverse recovery time (note 2)	t_{rr}	$I_F = -4A, dI/dt = 100A/\mu s$		24	48	ns
Diode reverse recovery charge (note 2)	Q_{rr}				8	16

- Notes :**
1. Pulse test; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
 2. Guaranteed by design, not subject to production testing.

Typical Characteristics

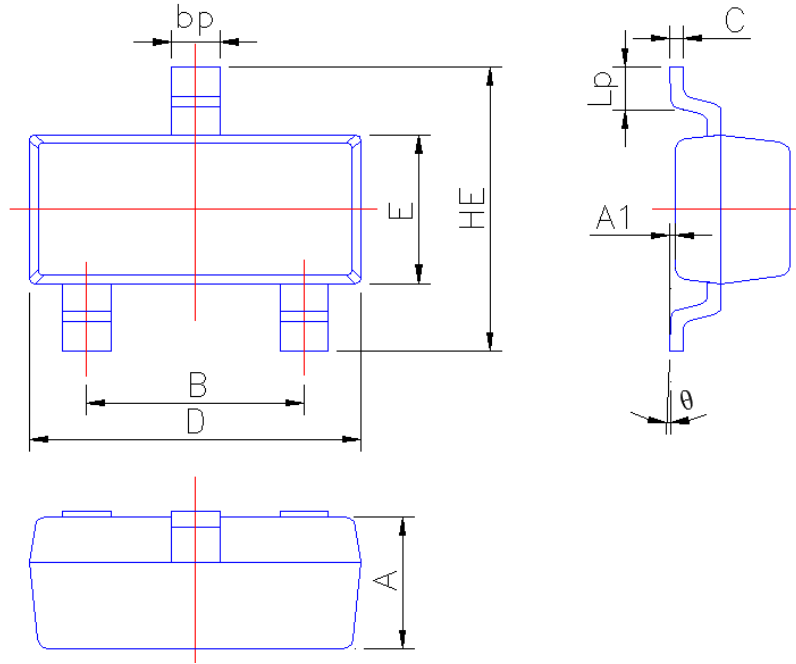




PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT-23



Symbol	Dimension in Millimeters	
	Min	Max
A	0.90	1.10
A1	0.013	0.100
B	1.80	2.00
bp	0.35	0.50
C	0.09	0.150
D	2.80	3.00
E	1.20	1.40
HE	2.20	2.80
Lp	0.20	0.50
θ	0°	5°