

MS23P01

P-Channel 20-V (D-S) MOSFET

Description

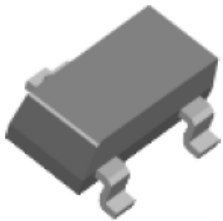
These miniature surface mount MOSFETs utilize a high cell density trench process to provide low $r_{DS(on)}$ and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

Features

- Low $r_{DS(on)}$ provides higher efficiency and extends battery life
- Low thermal impedance copper lead frame
- SOT-23 saves board space
- Fast switching speed
- High performance trench technology
- RoHS compliant package

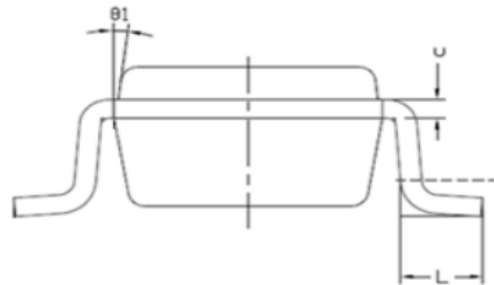
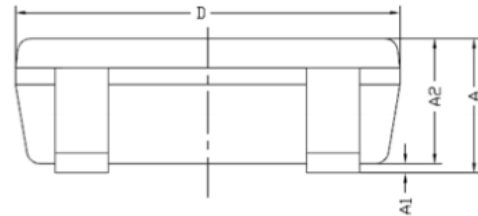
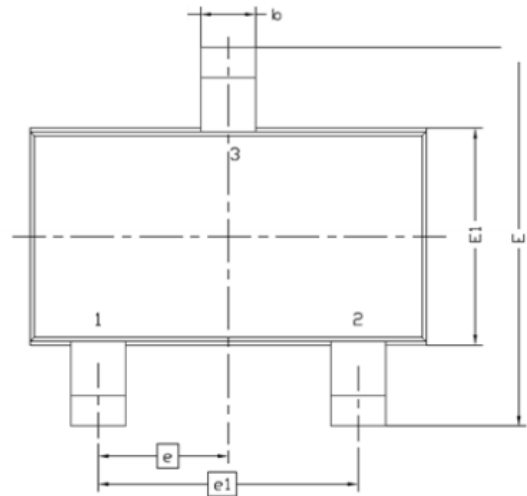
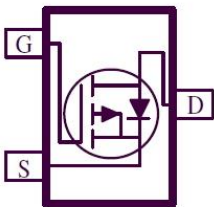
Packing & Order Information

3,000/Reel



**RoHS
COMPLIANT**

Graphic symbol



Symbol	MILLIMETERS	
	MIN	MAX
A	0.8	1.2
A1	0	0.1
A2	0.7	1.1
b	0.3	0.5
c	0.1	0.2
D	2.7	3.1
E	2.6	3
E1	1.4	1.8
e	0.95 BSC	
e1	1.9 BSC	
L	0.3	0.6
$\theta 1$	7° NOM	

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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 8	V
I_D	Continuous Drain Current ^a ($T_A=25^\circ\text{C}$)	-2.6	A
	Continuous Drain Current ^a ($T_A=70^\circ\text{C}$)	-1.5	A
I_{DM}	Pulsed Drain Current ^b	-10	A
I_S	Continuous Source Current (Diode Conduction) ^a	± 1.6	A
P_D	Power Dissipation ^a ($T_A=25^\circ\text{C}$)	1.25	W
	Power Dissipation ^a ($T_A=70^\circ\text{C}$)	0.8	W
T_J/T_{STG}	Operating Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ^a ($t \leq 5$ sec)	100	$^\circ\text{C/W}$
	Maximum Junction-to-Ambient ^a (Steady-State)	166	

Notes:

- Surface Mounted on 1" x 1" FR4 Board.
- Pulse width limited by maximum junction temperature

Static

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$V_{GS(th)}$	Gate-Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	-0.4		-1	
I_{GSS}	Gate-Body Leakage	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 100	nA
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$ $V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}, T_J = 55^\circ\text{C}$			-1 -10	μA
$I_{D(on)}$	On-State Drain Current ^A	$V_{DS} = -5\text{ V}, V_{GS} = -4.5\text{ V}$	-3			A
$r_{DS(on)}$	Drain-Source On-Resistance ^A	$V_{GS} = -4.5\text{ V}, I_D = -2.6\text{ A}$ $V_{GS} = -2.5\text{ V}, I_D = -2.1\text{ A}$			0.130 0.190	Ω
g_{fs}	Forward Transconductance ^A	$V_{DS} = -5\text{ V}, I_D = -2.8\text{ A}$		3		S
V_{SD}	Diode Forward Voltage	$I_S = -1.6\text{ V}, V_{GS} = 0\text{ V}$		-0.70		V

Dynamic^b

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -5\text{ V}, R_L = -5\text{ OHM}$ $V_{GEN} = -4.5\text{ V}, R_G = 6\text{ OHM}$	--	6.5	--	ns
t_r	Rise Time		--	20	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	31	--	ns
t_f	Fall Time		--	21	--	ns

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Dynamic ^b						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
Q_g	Total Gate Charge	$V_{DS} = -5\text{ V}$, $I_D = -2.6\text{ A}$, $V_{GS} = -4.5\text{ V}$	--	12.2	--	nC
Q_{gs}	Gate-Source Charge		--	1.1	--	nC
Q_{gd}	Gate-Drain Charge		--	1.5	--	nC

Notes:

- a. Pulse test: $PW \leq 300\mu s$ duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

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■ Characteristic Curves

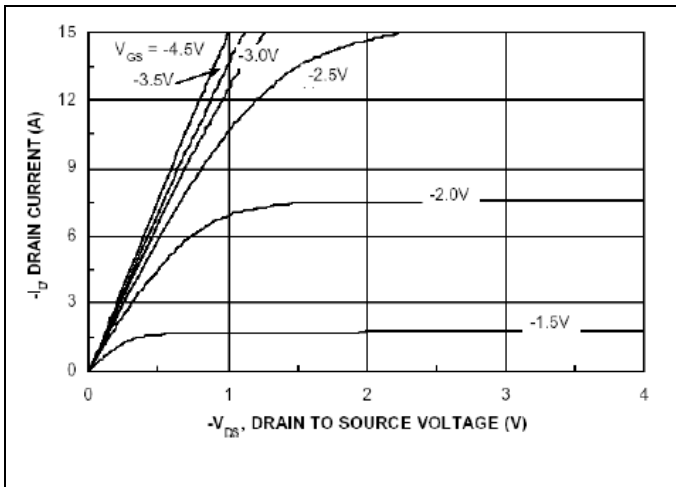


FIG.1-ON REGION CHARACTERISTICS

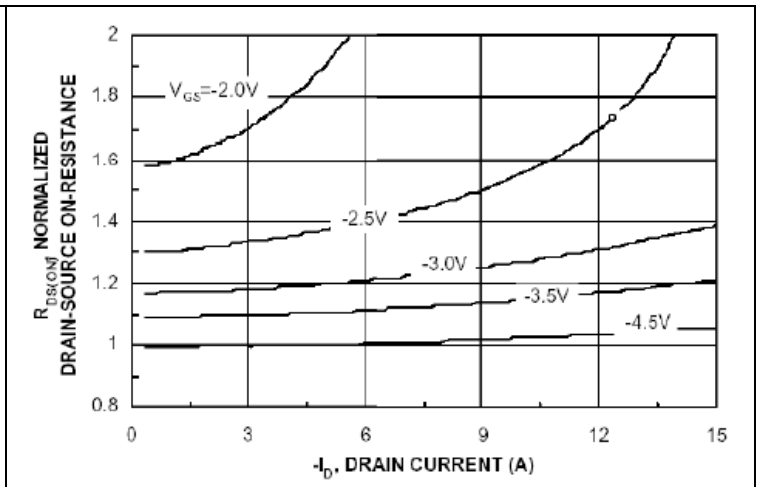


FIG.2-ON-RESISTANCE VARIATION WITH DRAIN CURRENT AND GATE VOLTAGE

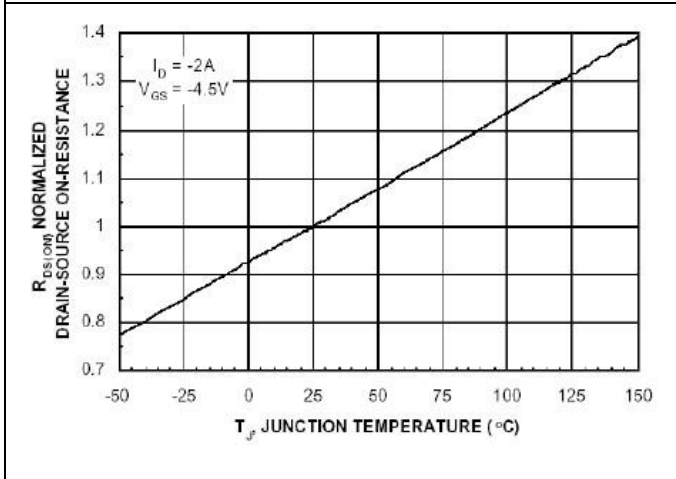


FIG.3-ON RESISTANCE VARIATION WITH TEMPERATURE

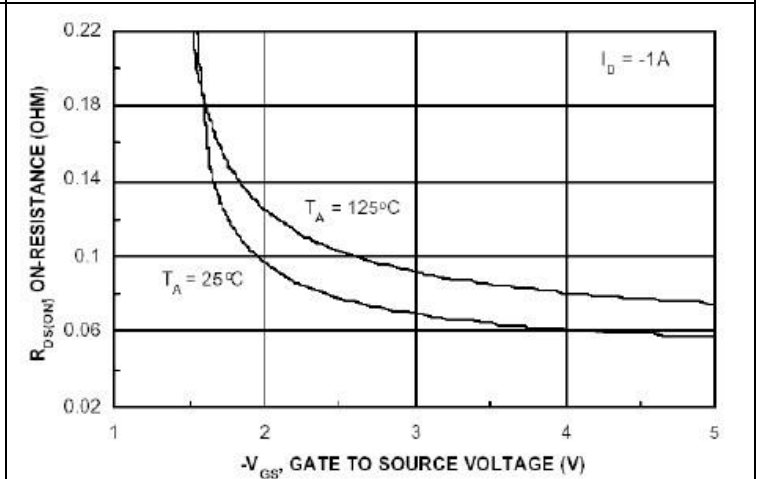


FIG.4-ON-RESISTANCE VARIATION WITH GATE TO SOURCE VOLTAGE

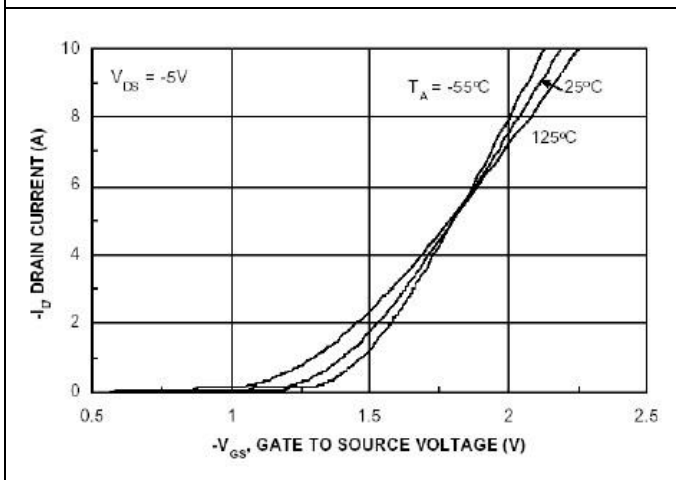


FIG.5-TRANSFER CHARACTERISTICS

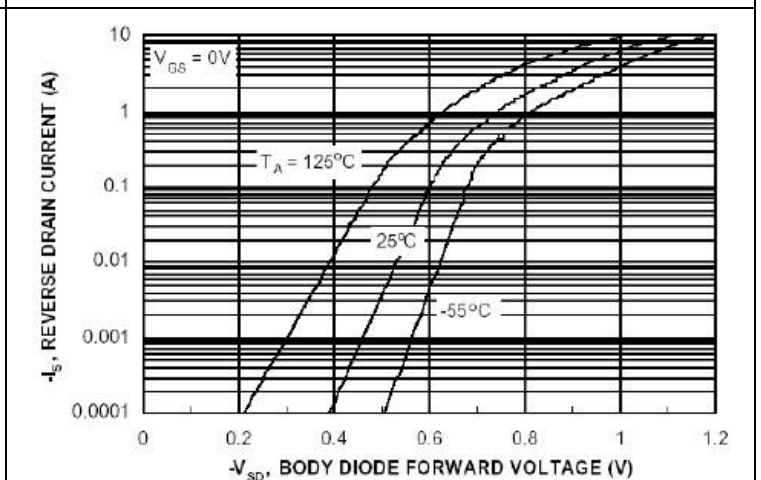


FIG.6-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

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■ Characteristic Curves

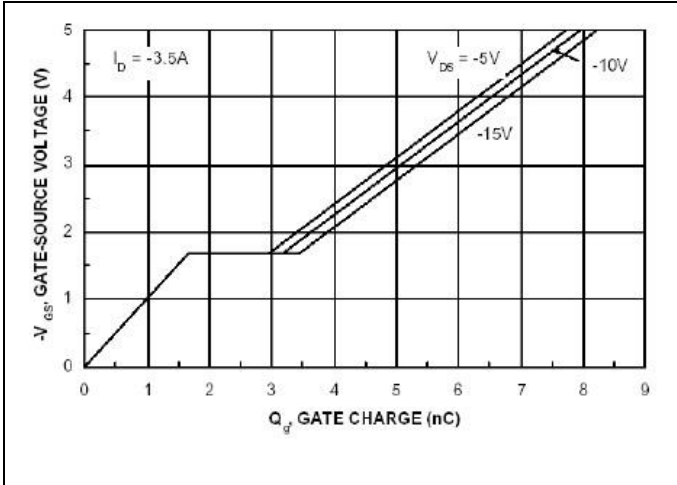


FIG.7-GATE CHARGE CHARACTERISTIC

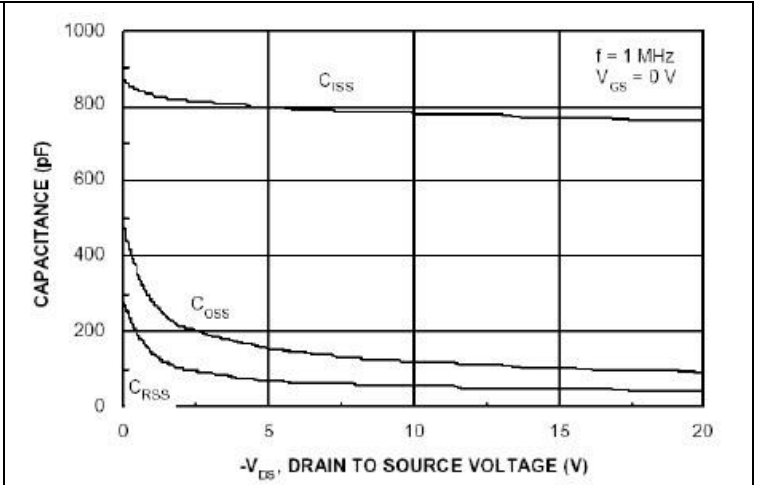


FIG.8-CAPACITANCE CHARACTERISTIC

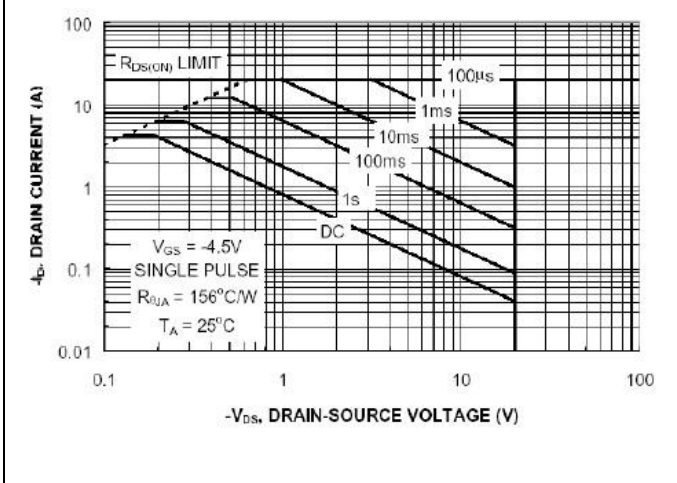


FIG.9-MAXIMUM SAFE OPERATING AREA

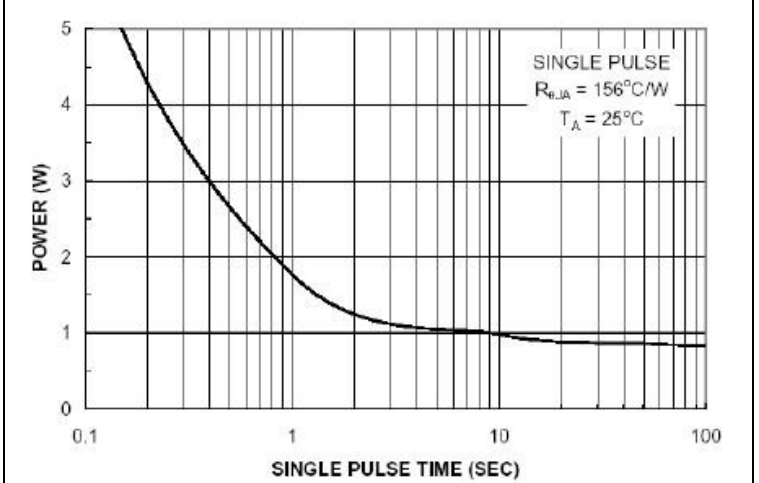


FIG.10-SINGLE PULSE MAXIMUM POWER DISSIPATION

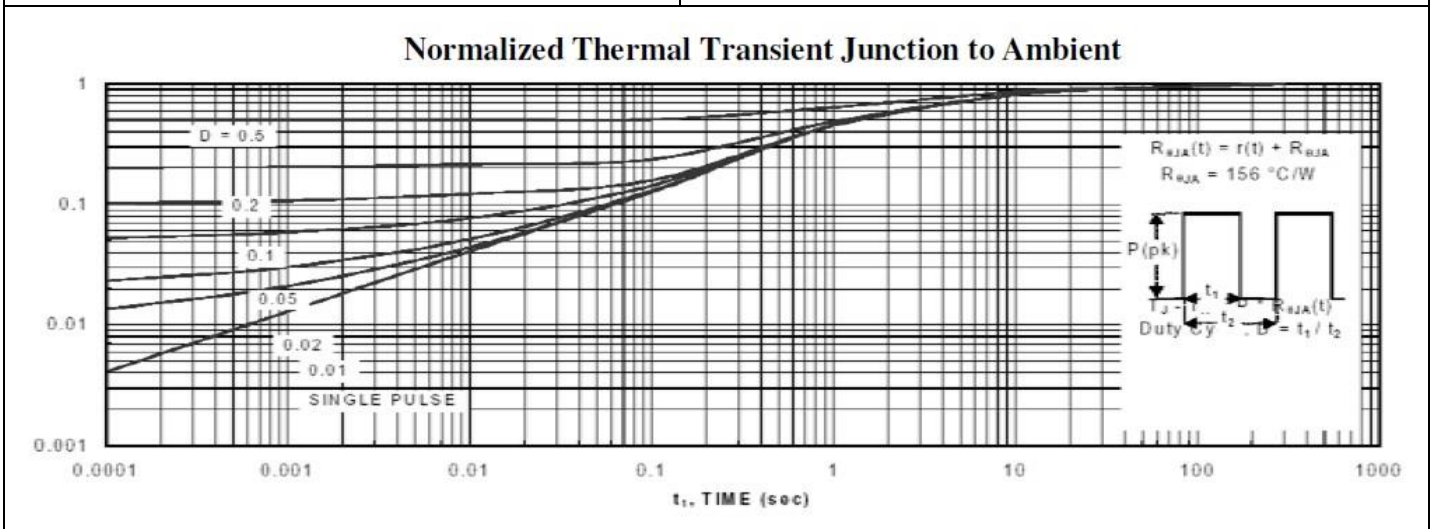


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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