MS13P21

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

Description

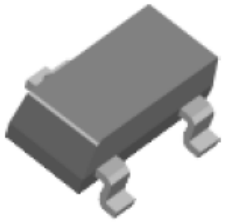
These miniature surface mount MOSFETs utilize a high cell density trench process to provide low rDS(on) and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards,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

Features

- Low rDS(on) provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe SC70-3 saves board space
- Fast switching speed
- High performance trench technology
- RoHS compliant package

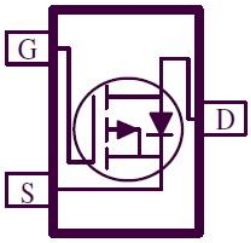
Packing & Order Information

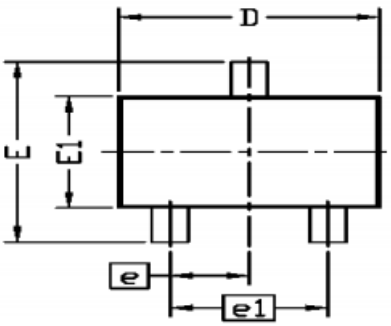
3,000/Reel

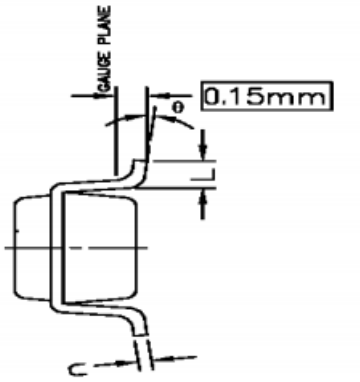


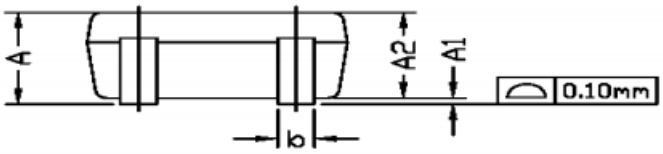
RoHS
COMPLIANT

Graphic symbol









SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A		—	1.10		—	0.043
A1	0.00	—	0.10	0.00	—	0.004
A2	0.7	0.9	1.00	0.028	0.035	0.039
b	0.15	—	0.30	0.006	—	0.012
c	0.08	—	0.22	0.003	—	0.009
D	1.85	2.10	2.15	0.073	0.083	0.085
E	1.80	2.30	2.40	0.071	0.091	0.094
e	0.65 BSC			0.026 BSC		
e1	1.30 BSC			0.051 BSC		
E1	1.1	1.30	1.4	0.043	0.051	0.055
L	0.26	0.36	0.46	0.010	0.014	0.018
θ	0°	4°	8°	0°	4°	8°

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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (T_A=25°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°C)	-1.7	A
	Continuous Drain Current$_a$ (T_A =70°C)	-1.4	A
I_{DM}	Pulsed Drain Current[b]	-2.5	A
I_S	Continuous Source Current (Diode Conduction)[a]	±0.28	A
P_D	Power Dissipation[a] (T_A =25°C)	0.34	W
	Power Dissipation[a] (T_A =70°C)	0.22	W
T_J/T_{STG}	Operating Junction and Storage Temperature	-55 to +150	°C

THERMAL RESISTANCE RATINGS

Symbol	Parameter	Maximum	Units
R_{THJA}	Maximum Junction-to-Ambient C/W[a] (t <= 5 sec)	375	°C/W
	Maximum Junction-to-Ambient C/W[a] (Steady-State)	430	

Notes

a. Surface Mounted on 1” x 1” FR4 Board.

b. Pulse width limited by maximum junction temperature

Static

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
V_{GS}	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D =-250μA	-0.4			V
I_{GSS}	Gate-Body Leakage	V_{DS} = 0 V , V_{GS} = ±8 V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -16 V , V_{GS} = 0 V V_{DS} = -16 V , V_{GS} = 0 V , T_J= 55°C			-1 -10	uA
$I_{D(on)}$	On-State Drain Current[A]	V_{DS} = -5 V, V_{Gs} = -4.5 V	-5			A
$I_{DS(on)}$	Drain-Source On-Resistance[A]	V_{GS} = -4.5 V, I_D = -1.7 A V_{GS} = -2.5 V, I_D = -1.5 A			79 110	mΩ
g_{fs}	Forward Tranconductance[A]	V_{DS} = -5V, I_D = -1.25 A		9		S
V_{SD}	Diode Forward Voltage	I_S = -0.46 V, V_{GS} = 0 V		-0.65		V

Dynamic[b]

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = -10 V , I_L = -1 A, V_{GEN} = -4.5 V , R_G = 6 Ω	--	10	--	ns
t_r	Rise Time		--	9	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	27	--	ns
tf	Fall Time		--	11	--	ns

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Dynamic[b]						
Symbol	**Parameter**	**Test Conditions**	**Min**	**Typ.**	**Max.**	**Units**
Q_g	Total Gate Charge	V_{DS}= -10 V , I_D = -1.7 A, V_{GS}= -4.5 V	--	7.2	--	nC
Q_{gs}	Gate-Source Charge		--	1.7	--	nC
Q_{gd}	Gate-Drain Charge		--	1.5	--	nC

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■Typical Electrical Characteristics

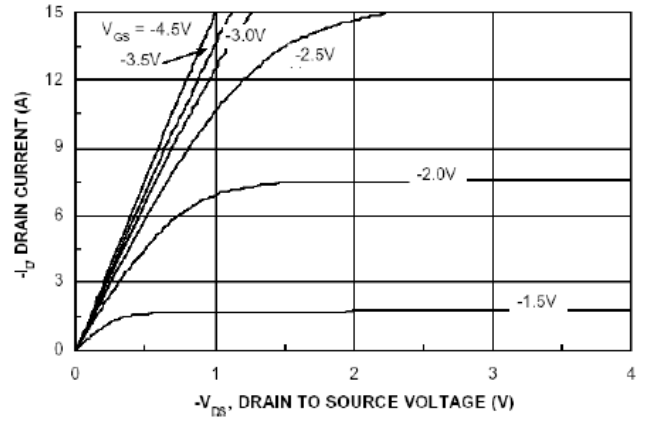

FIG.1-ON REGION CHARACTERISTICS

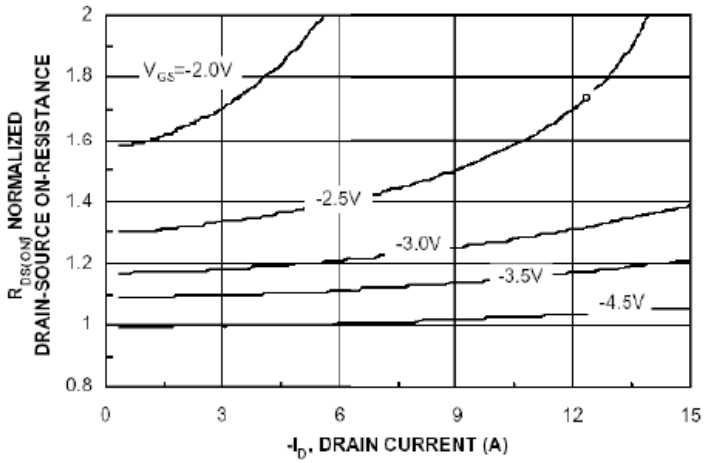

FIG.2-ON-RESISTANCE VARIATION WITH DRAIN CURRENT AND GATE VOLTAGE

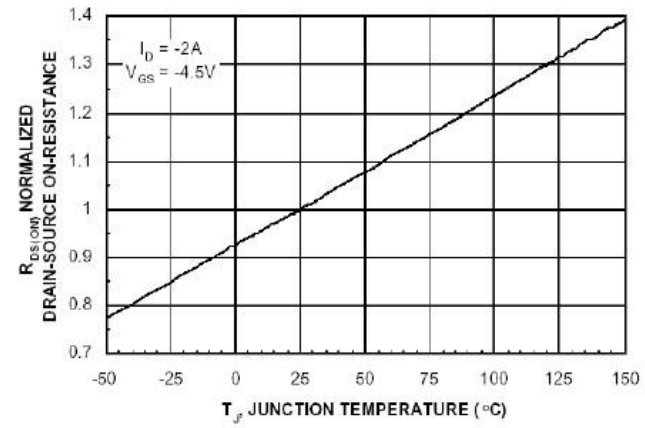

FIG.3-ON RESISTANCE VARIATION WITH TEMPERATURE

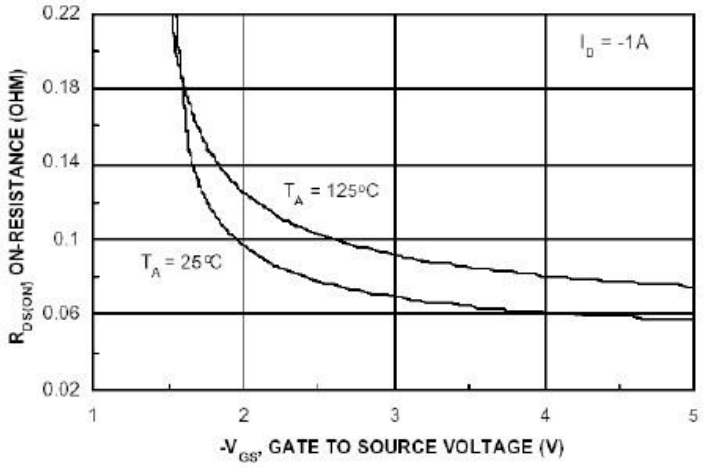

FIG.4-ON-RESISTANCE VARIATION WITH GATE TO SOURCE VOLTAGE

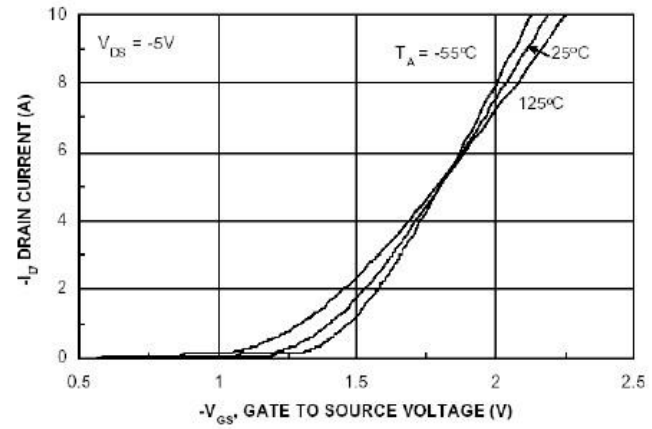

FIG.5-TRANSFER CHARACTERISTICS

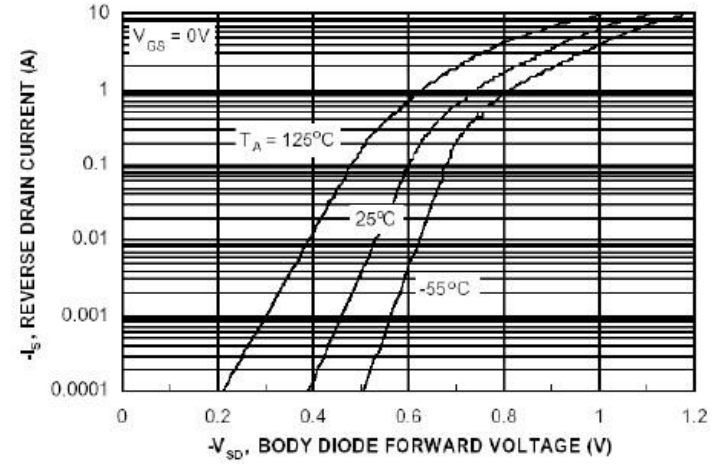

FIG.6-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

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■Typical Electrical Characteristics

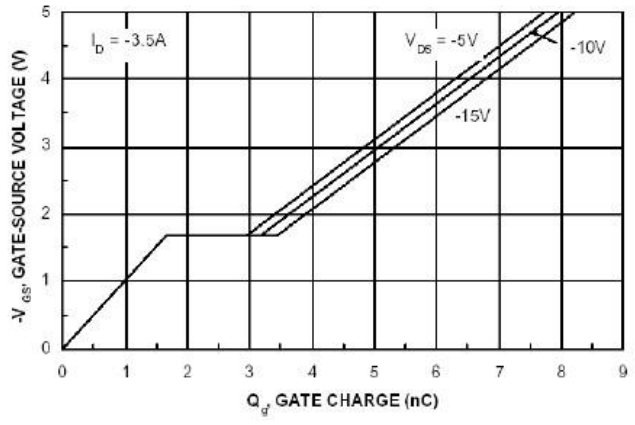

FIG.7-GATE CHARGE CHARACTERISTIC

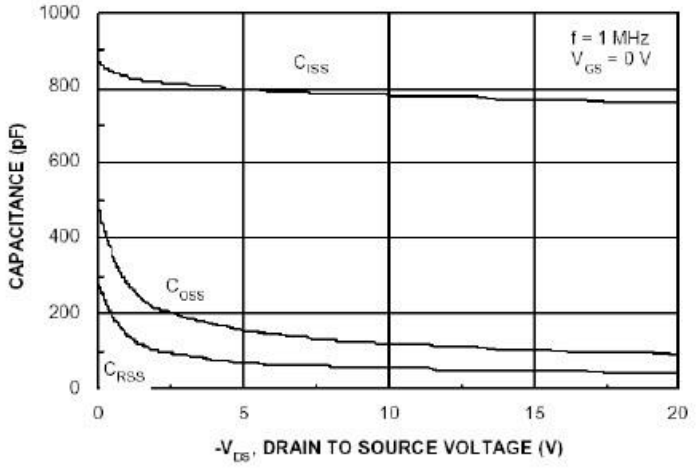

FIG.8-CAPACITANCE CHARACTERISTIC

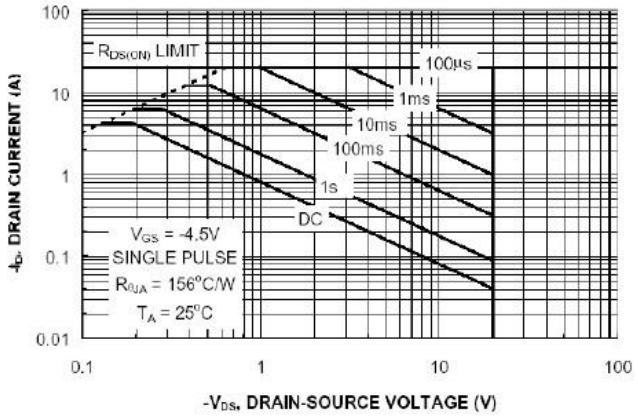

FIG.9-MAXIMUM SAFE OPERATING AREA

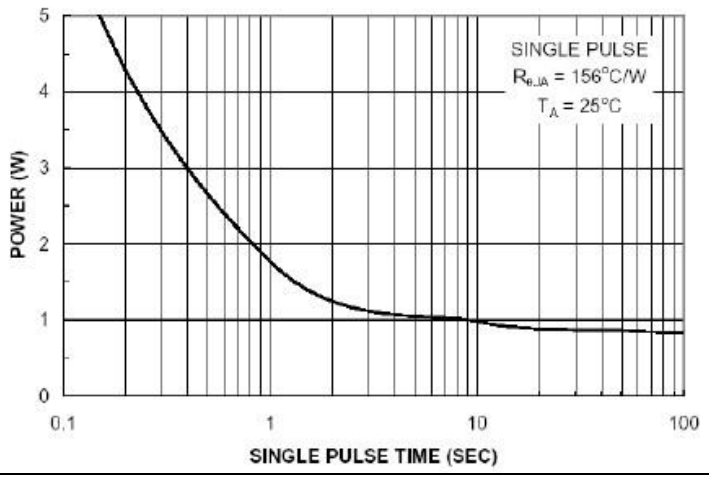

FIG.10-SINGLE PULSE MAXIMUM POWER DISSIPATION

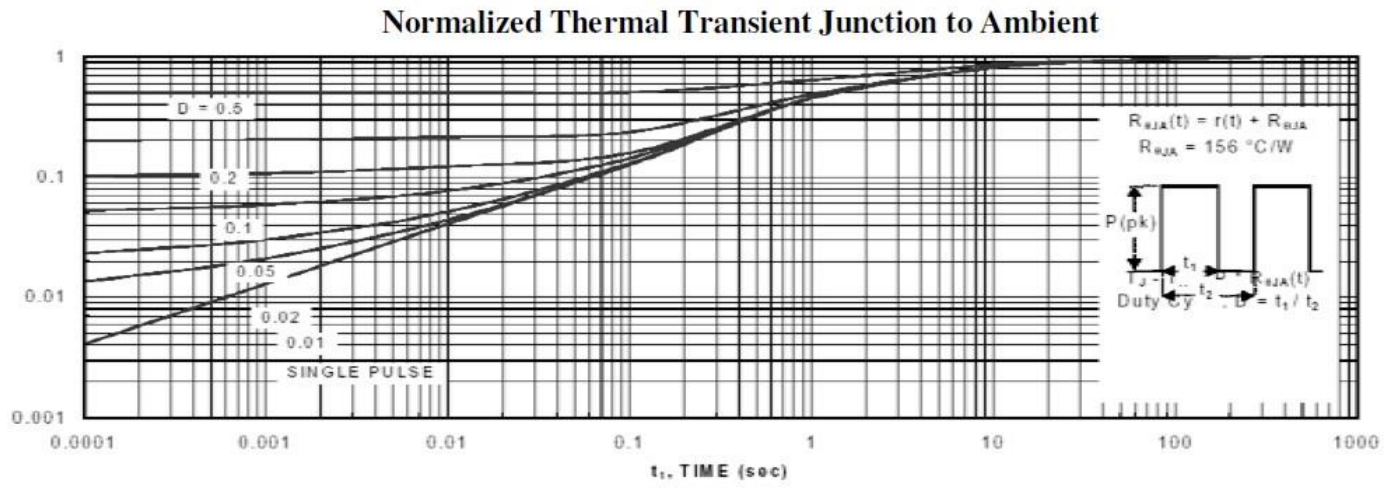

FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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