MS14P21

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

Description

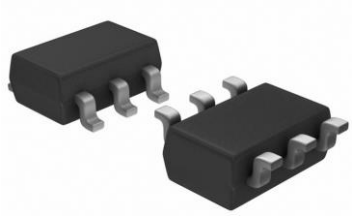
These miniature surface mount MOSFETs utilize a high cell density trench process to provide low rDS(on) and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards,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

Features

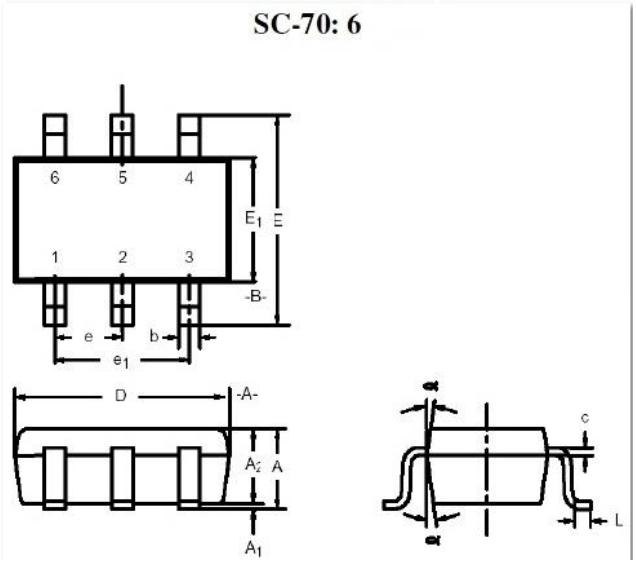
- Low rDS(on) provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe SC70-6 saves board space
- Fast switching speed
- High performance trench technology
- RoHS compliant package

Packing & Order Information

3,000/Reel

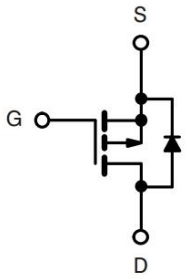


RoHS
COMPLIANT



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.90	–	1.10	0.035	–	0.043
A_1	–	–	0.10	–	–	0.004
A_2	0.80	–	1.00	0.031	–	0.039
b	0.15	–	0.30	0.006	–	0.012
c	0.10	–	0.25	0.004	–	0.010
D	1.80	2.00	2.20	0.071	0.079	0.087
E	1.80	2.10	2.40	0.071	0.083	0.094
E_1	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65BSC			0.026BSC		
e_1	1.20	1.30	1.40	0.047	0.051	0.055
L	0.10	0.20	0.30	0.004	0.008	0.012
∝	7°Nom			7°Nom		

Graphic symbol



MS14P21

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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (Tc=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)	-3.7	A
	Continuous Drain Current[a] (T_A =70°C)	-3.0	A
I_{DM}	Pulsed Drain Current[b]	-10	A
I_S	Continuous Source Current (Diode Conduction)[a]	±1.4	A
P_D	Power Dissipation[a] (T_A =25°C)	1.56	W
	Power Dissipation[a] (T_A =70°C)	0.81	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)	80	°C/W
	Maximum Junction-to-Ambient C/W[a] (Steady-State)	125	

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
$V_{GS(th)}$		V_{DS} = V_{GS}, I_D=-250 μA	-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 = -3.7 A V_{GS} = -2.5 V, I_D = -3.1 A V_{GS} = -1.8 V, I_D = -2.6 A			79 110 160	mΩ
g_{fs}	Forward Tranconductance[A]	V_{DS} = -5 V, I_D = -1.25 A		9		S
V_{SD}	Diode Forward Voltage	I_S = -0.46 V, V_{GS} = 0 V		-0.65		V

MS14P21

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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
Q_g	Total Gate Charge	V_{DS} = -10 V , I_D =-3.7 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

Notes:

a. Pulse test: PW <= 300us duty cycle <= 2%.

b. Guaranteed by design, not subject to production testing.

c. Repetitive rating, pulse width limited by junction temperature.

MS14P21

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■Typical Electrical Characteristics

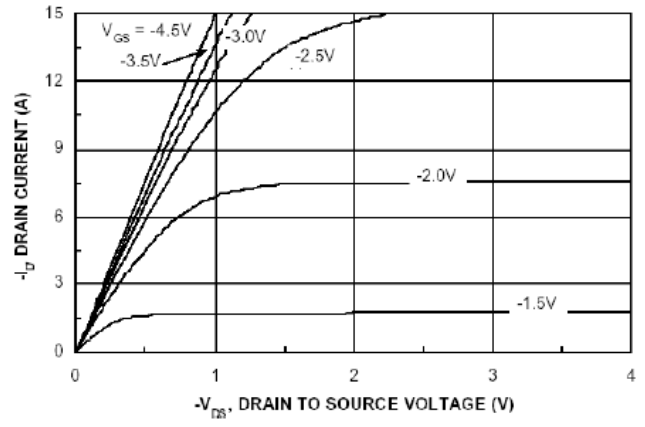

FIG.1-ON REGION CHARACTERISTICS

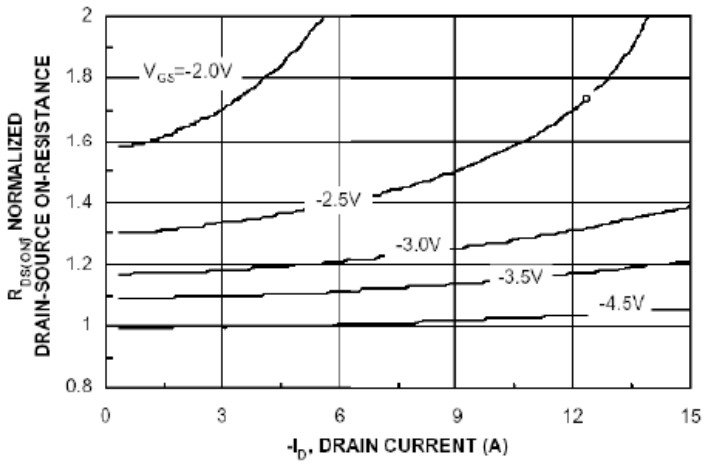

FIG.2-TRANSFER CHARACTERISTICS

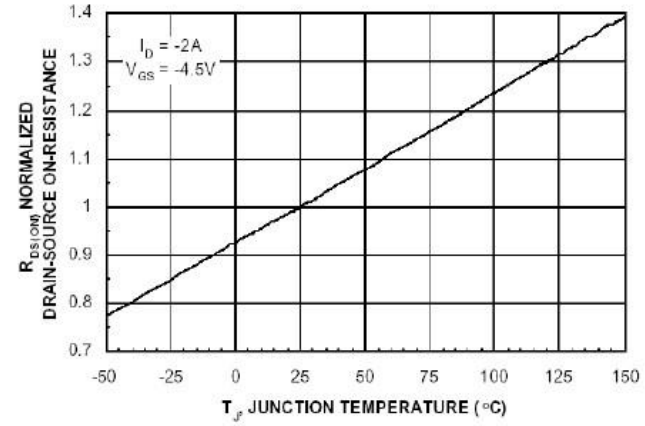

FIG.3- ON-RESISTANCE VARIATION WITH TEMPERATURE

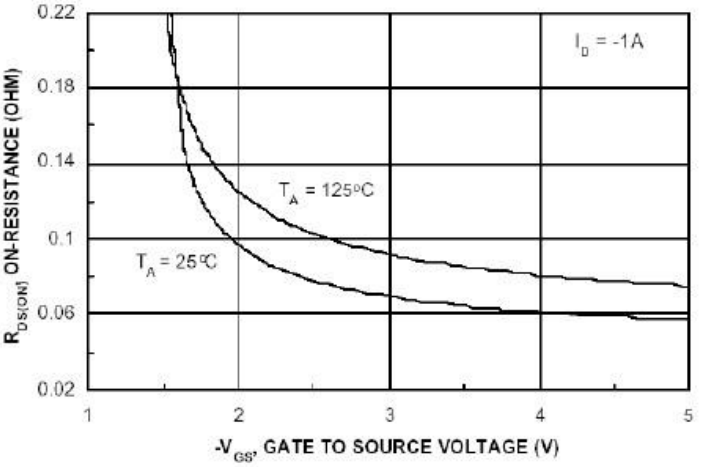

FIG.4-ON-RESISTANCE VARIATION WITH GATE TO SOURCE WOLTAGE

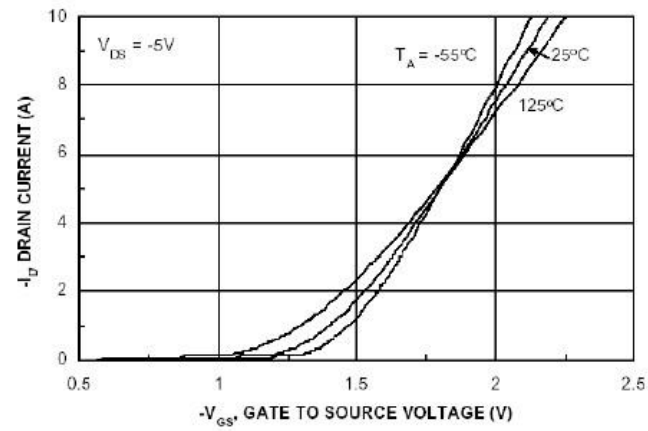

FIG.5-TRANSFER CHARACTERISTICS

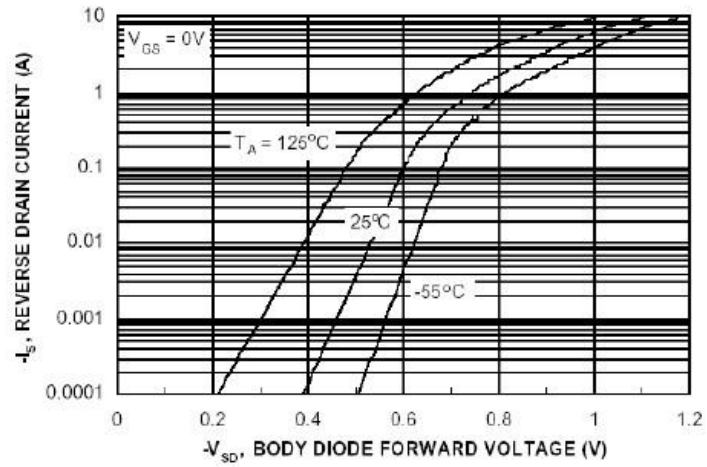

FIG.6-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

MS14P21

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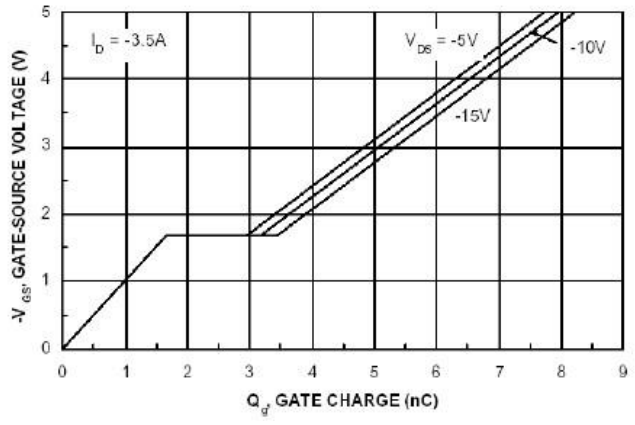

FIG.7-GATE CHARGE CHARACTERISTIC

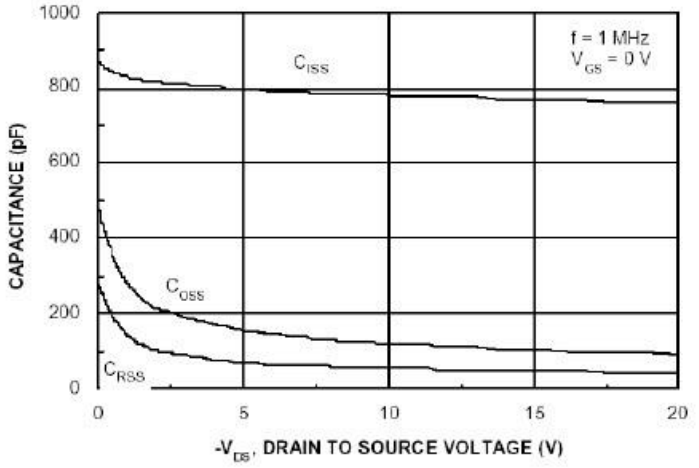

FIG.8-CAPACITANCE CHARACTERISTIC

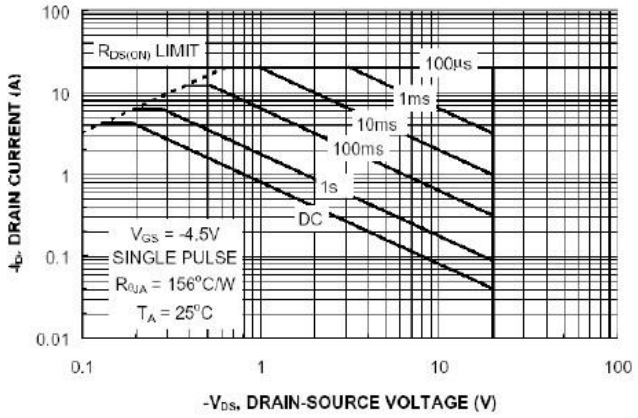

FIG.9-MAXIMUM SAFE OPERATING AREA

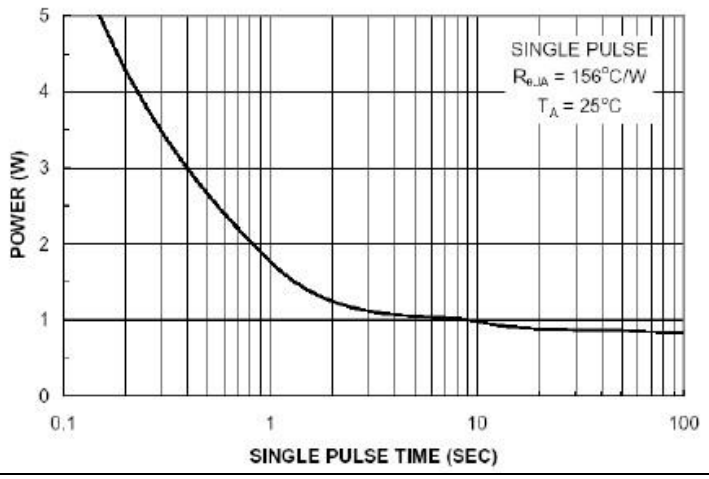

FIG.10-SINGLE PULSE MAXIMUM POWER DISSIPATION

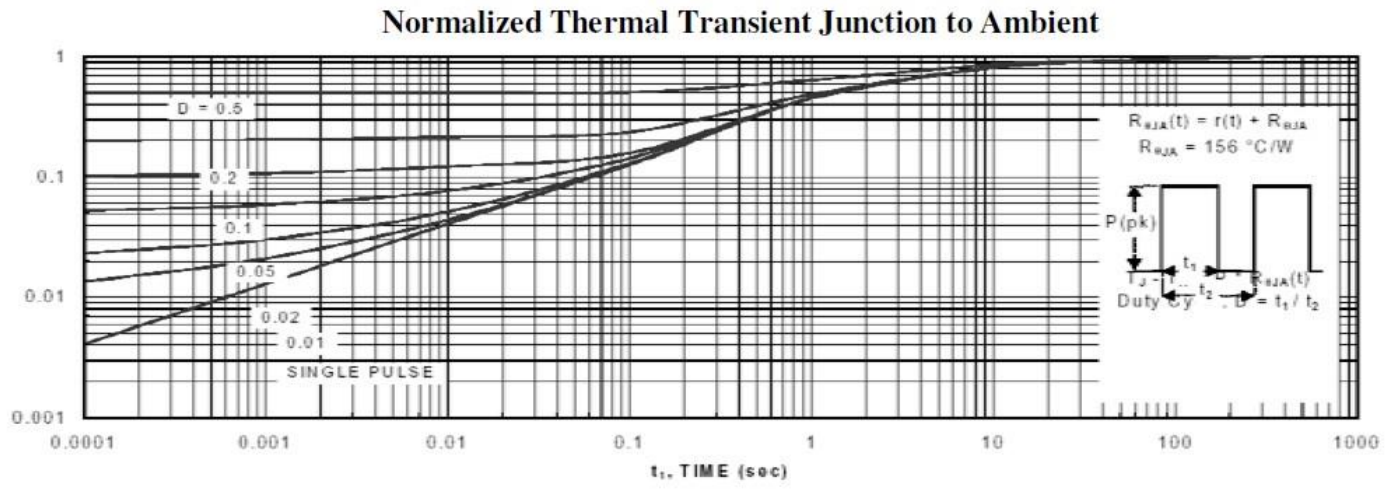

FIG.11-TRANSIENT THERMAL RESPONSE CURVE

MS14P21

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