

MS 14P21

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.

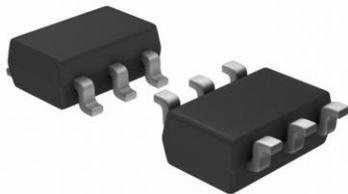
Features

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

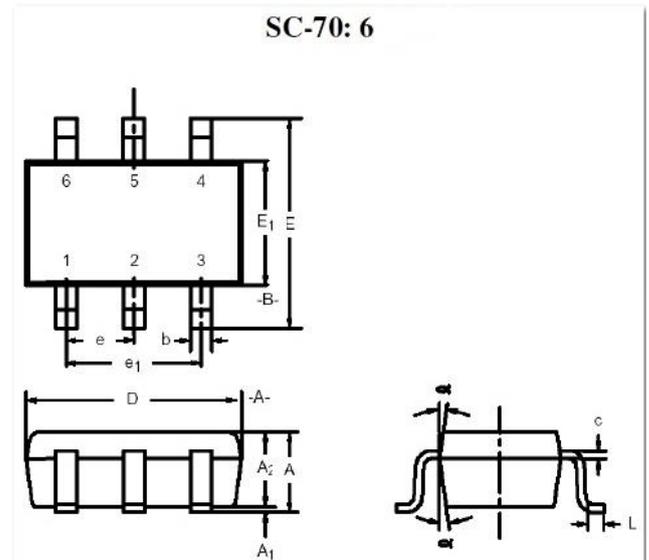
Package type : SC70-6

Packing & Order Information

3,000/Reel

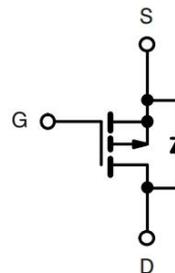


**RoHS
COMPLIANT**



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.90	–	1.10	0.035	–	0.043
A₁	–	–	0.10	–	–	0.004
A₂	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
E₁	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65BSC			0.026BSC		
e₁	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
α	7°Nom			7°Nom		

Graphic symbol



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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 :

- 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)}		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
R _{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 Transconductance ^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

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Dynamic ^b						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -10\text{ V}$, $I_L = -1\text{ A}$, $V_{GEN} = -4.5\text{ V}$, $R_G = 6\ \Omega$	--	10	--	ns
t_r	Rise Time		--	9	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	27	--	ns
t_f	Fall Time		--	11	--	ns
Q_g	Total Gate Charge	$V_{DS} = -10\text{ V}$, $I_D = -3.7\text{ A}$, $V_{GS} = -4.5\text{ V}$	--	7.2	--	nC
Q_{gs}	Gate-Source Charge		--	1.7	--	nC
Q_{gd}	Gate-Drain Charge		--	1.5	--	nC

Notes :

- Pulse test: $PW \leq 300\mu s$ duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Repetitive rating, pulse width limited by junction temperature.

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Typical Electrical Characteristics

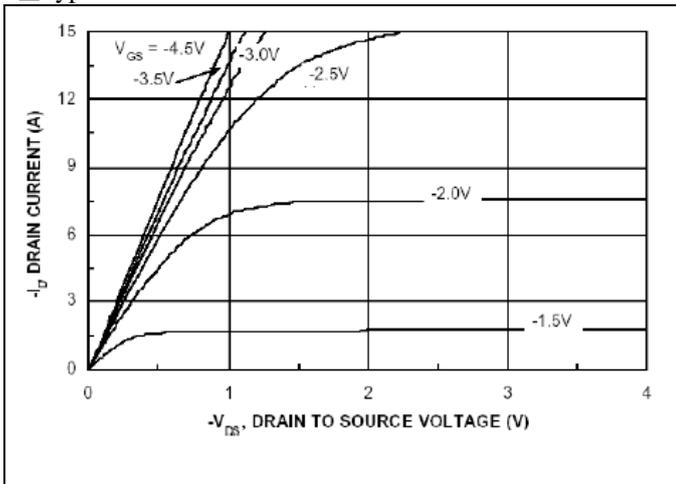


FIG.1-ON REGION CHARACTERISTICS

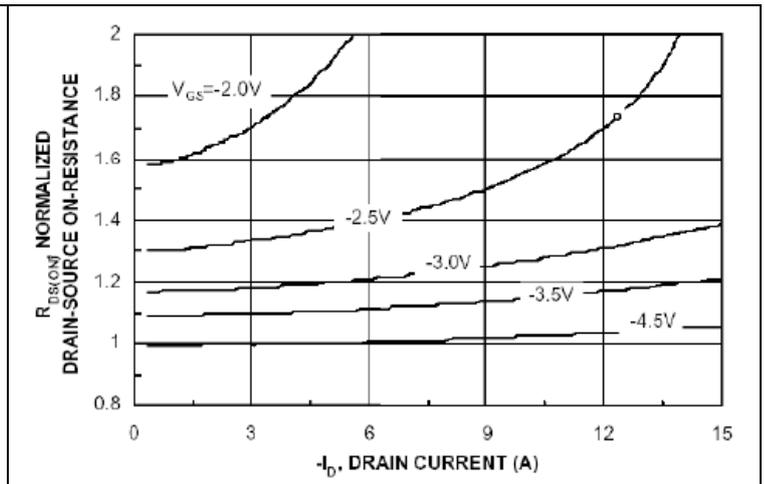


FIG.2-TRANSFER CHARACTERISTICS

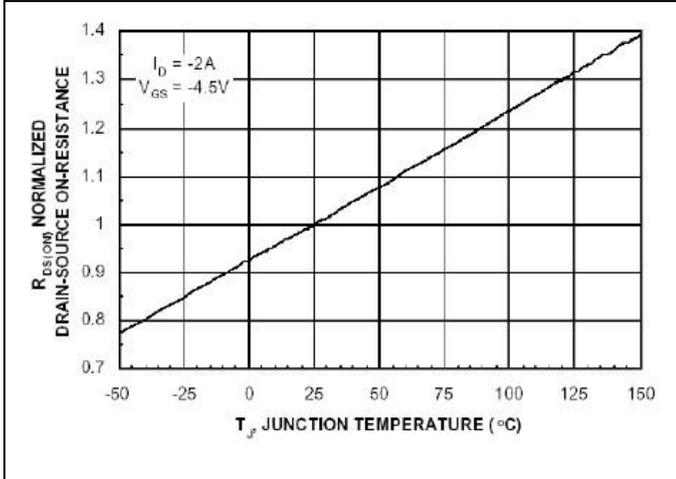


FIG.3- ON-RESISTANCE VARIATION WITH TEMPERATURE

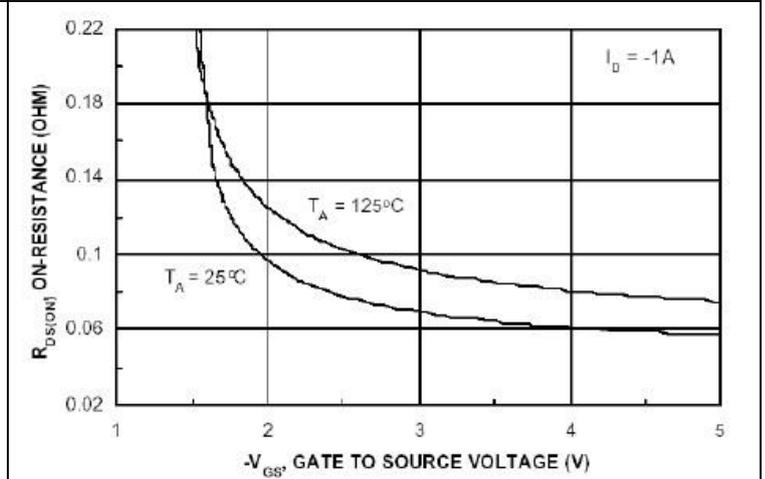


FIG.4-ON-RESISTANCE VARIATION WITH GATE TO SOURCE VOLTAGE

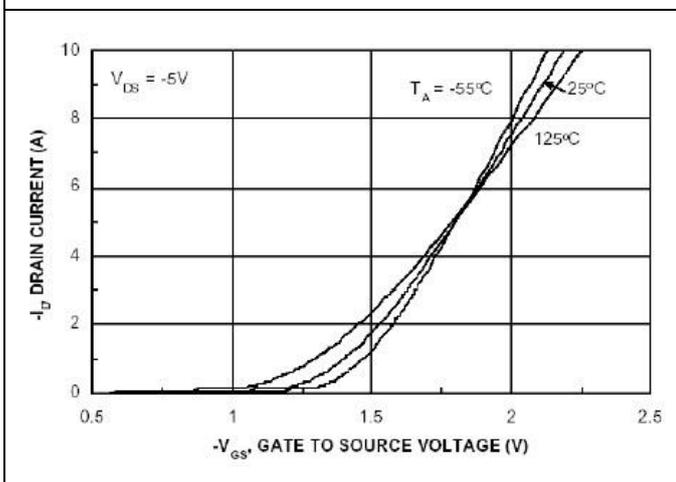


FIG.5-TRANSFER CHARACTERISTICS

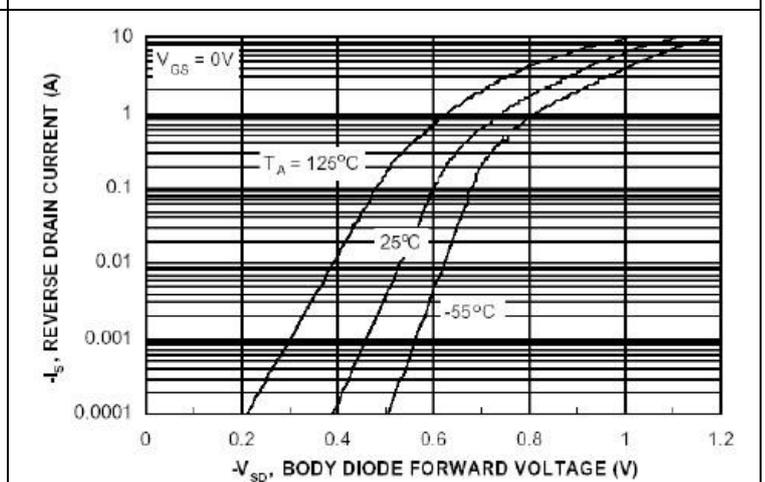


FIG.6-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

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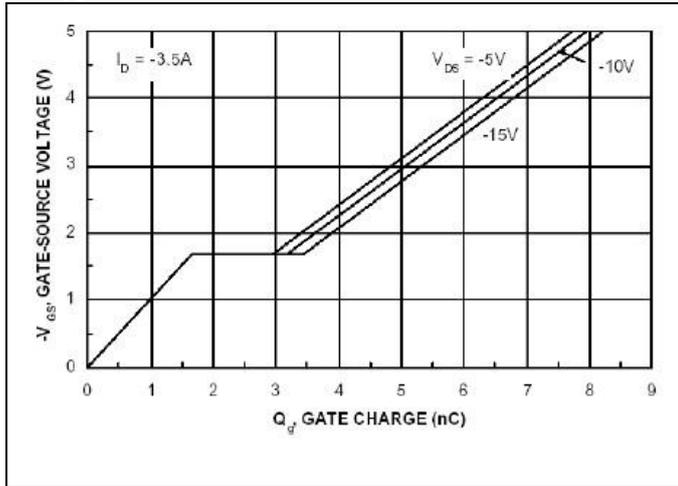


FIG.7-GATE CHARGE CHARACTERISTIC

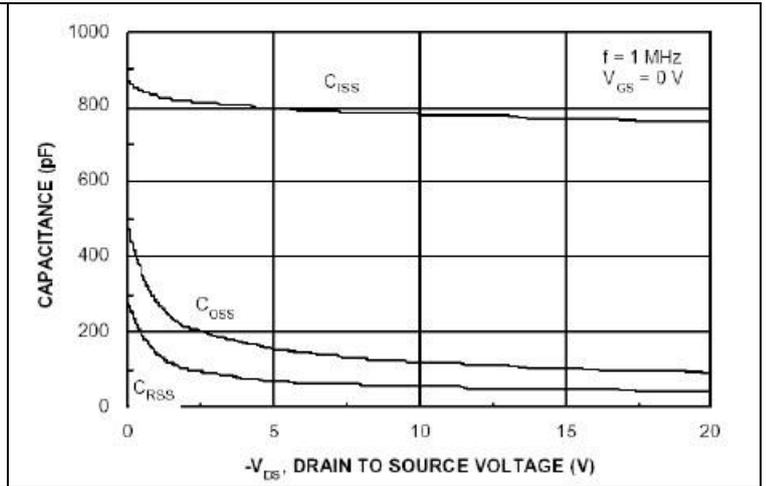


FIG.8-CAPACITANCE CHARACTERISTIC

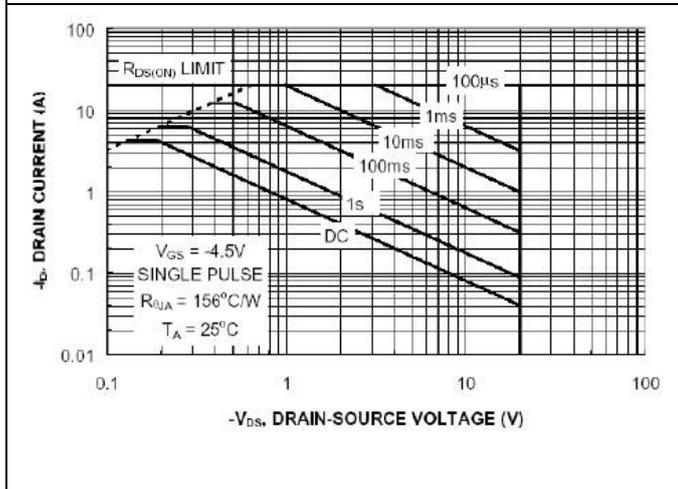


FIG.9-MAXIMUM SAFE OPERATING AREA

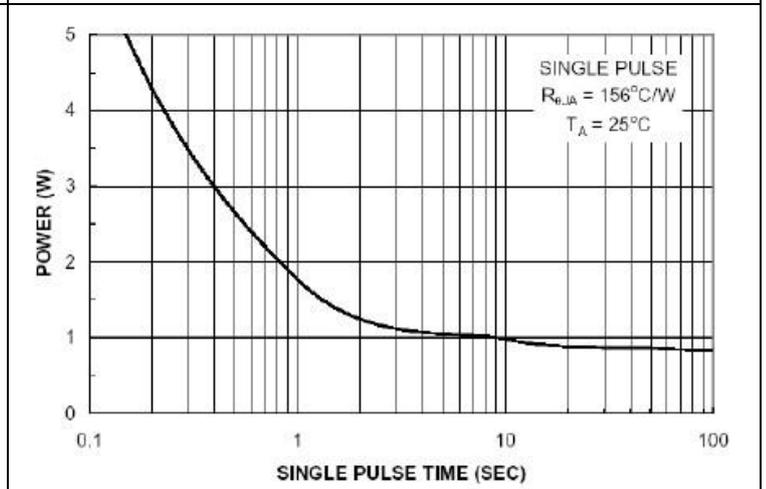


FIG.10-SINGLE PULSE MAXIMUM POWER DISSIPATION

Normalized Thermal Transient Junction to Ambient

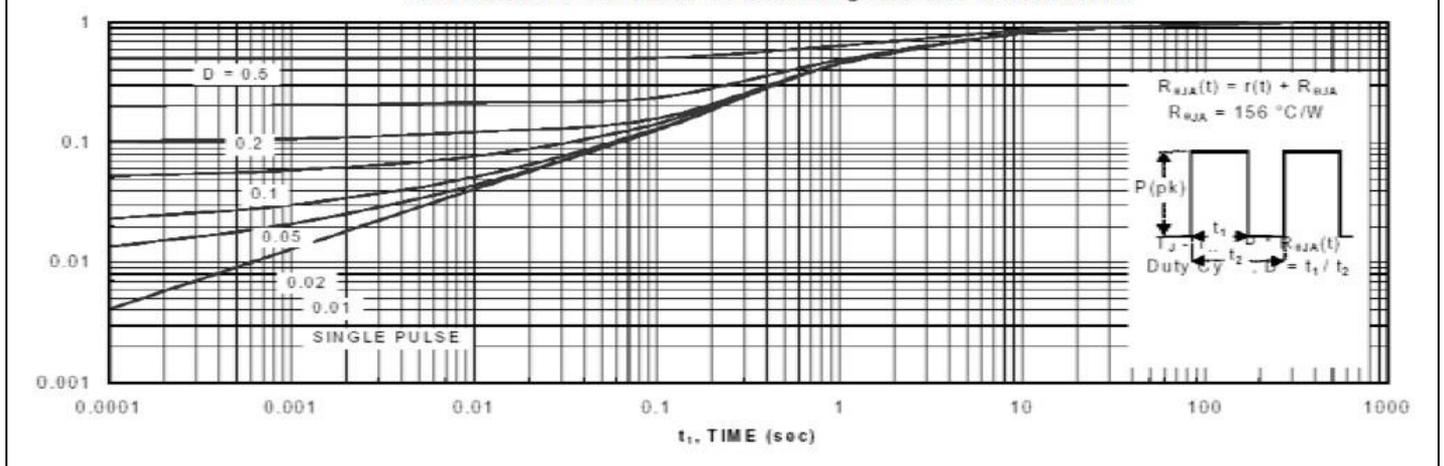


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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