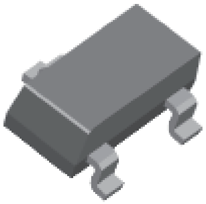
P-Channel 20-V (D-S) MOSFET

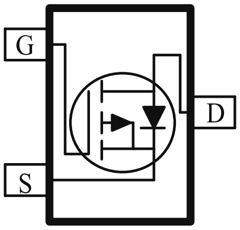
These miniature surface mount MOSFETs utilize a high cell density trench process to provide low $r_{DS(on)}$ and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA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

PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (OHM)	I_D (A)
-20	0.079 @ V_{GS} = -4.5V	-1.7
	0.110 @ V_{GS} = -2.5V	-1.5

- Low $r_{DS(on)}$ provides higher efficiency and extends battery life
- Low thermal impedance copper leadframe SC70-3 saves board space
- Fast switching speed
- High performance trench technology





ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C UNLESS OTHERWISE NOTED)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	±8	
Continuous Drain Current[a]	T_A=25°C	I_D	-1.7	A
	T_A=70°C		-1.4	
Pulsed Drain Current[b]		I_{DM}	-2.5	
Continuous Source Current (Diode Conduction)[a]		I_S	±0.28	A
Power Dissipation[a]	T_A=25°C	P_D	0.34	W
	T_A=70°C		0.22	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150	°C

THERMAL RESISTANCE RATINGS

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

Notes

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

b. Pulse width limited by maximum junction temperature

SPECIFICATIONS ($T_A = 25^{o}C$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
Static						
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250$ uA	-0.4			V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 8$ V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -16$ V, $V_{GS} = 0$ V			-1	uA
		$V_{DS} = -16$ V, $V_{GS} = 0$ V, $T_J = 55^{o}C$			-10	
On-State Drain Current[A]	$I_{D(on)}$	$V_{DS} = -5$ V, $V_{GS} = -4.5$ V	-5			A
Drain-Source On-Resistance[A]	$r_{DS(on)}$	$V_{GS} = -4.5$ V, $I_D = -1.7$ A			79	mΩ
		$V_{GS} = -2.5$ V, $I_D = -1.5$ A			110	
Forward Tranconductance[A]	g_{fs}	$V_{DS} = -5$ V, $I_D = -1.25$ A		9		S
Diode Forward Voltage	V_{SD}	$I_S = -0.46$ A, $V_{GS} = 0$ V		-0.65		V
Dynamic[b]						
Total Gate Charge	Q_g	$V_{DS} = -10$ V, $V_{GS} = -4.5$ V, $I_D = -1.7$ A		7.2		nC
Gate-Source Charge	Q_{gs}			1.7		
Gate-Drain Charge	Q_{gd}			1.5		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10$ V, $I_L = -1$ A, $V_{GEN} = -4.5$ V, $R_G = 6\ \Omega$		10		ns
Rise Time	t_r			9		
Turn-Off Delay Time	$t_{d(off)}$			27		
Fall-Time	t_f			11		

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.

Typical Electrical Characteristics

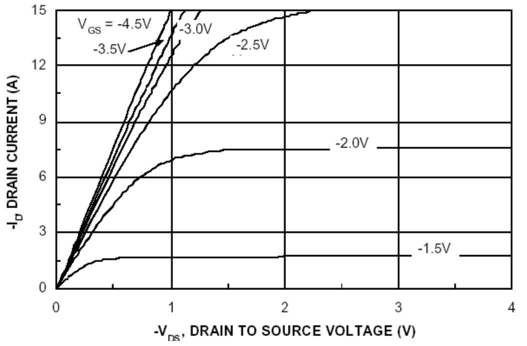


Figure 1. On-Region Characteristics

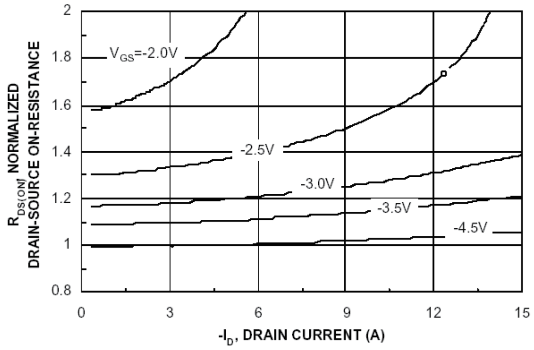


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

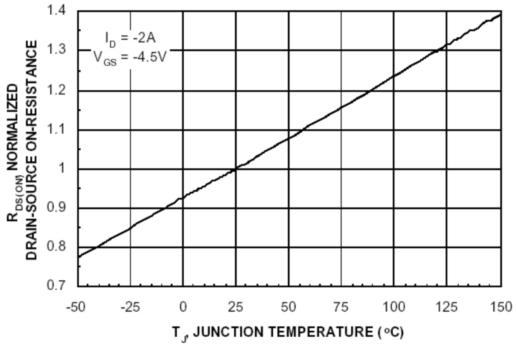


Figure 3. On-Resistance Variation

with Temperature

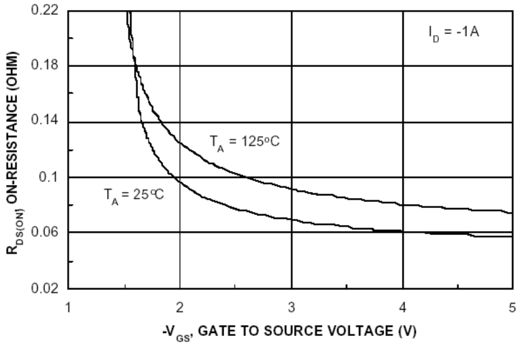


Figure 4. On-Resistance Variation with

Gate to Source Voltage

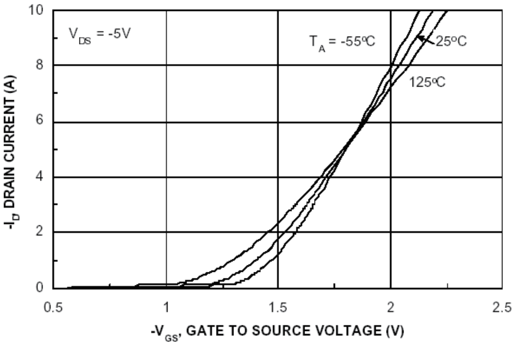


Figure 5. Transfer Characteristics

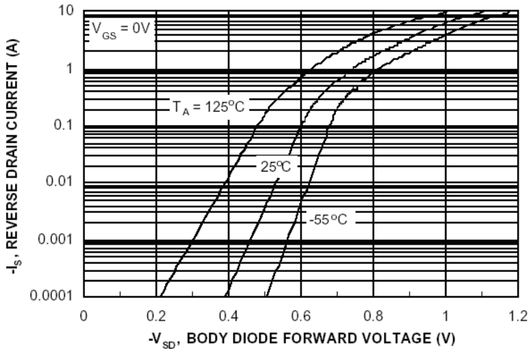
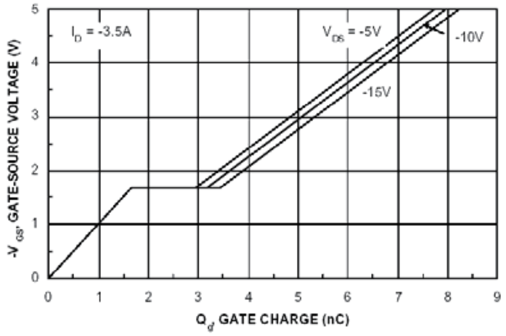


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Typical Electrical Characteristics



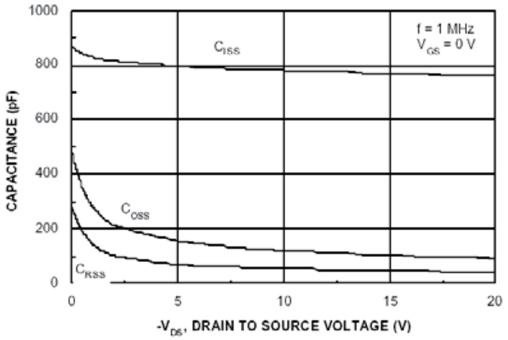
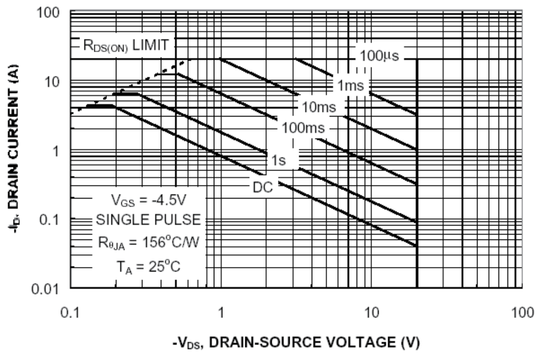


Figure 7. Gate Charge Characteristic

Figure 8. Capacitance Characteristic



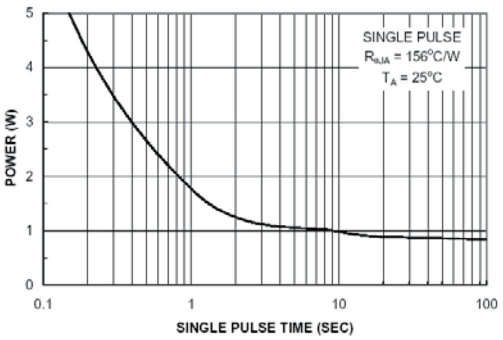


Figure 9. Maximum Safe Operating Area

Figure 10. Single Pulse Maximum Power Dissipation

Normalized Thermal Transient Junction to Ambient

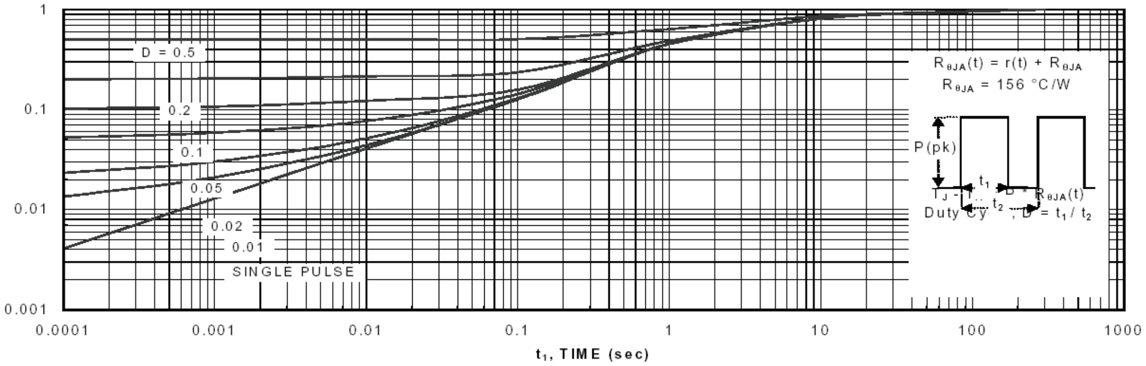
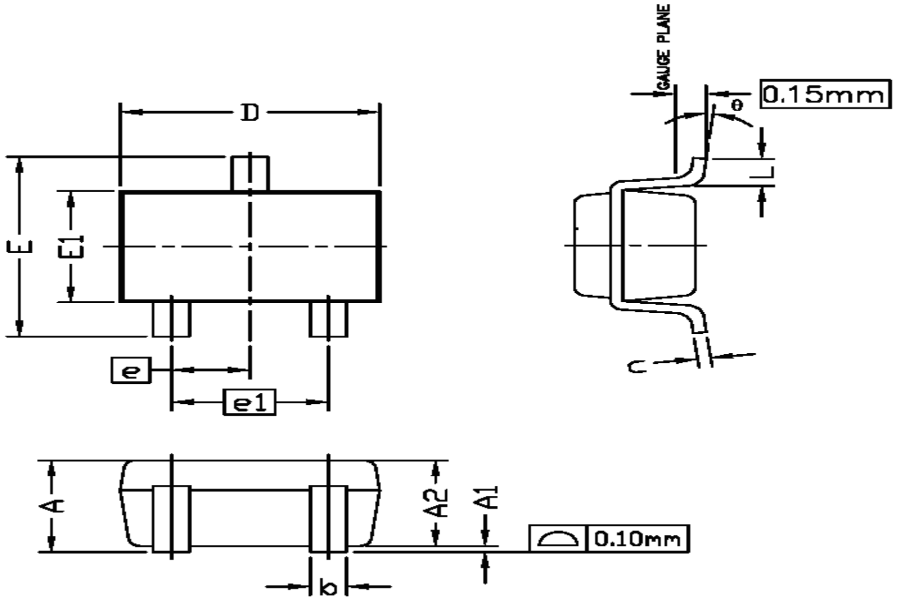


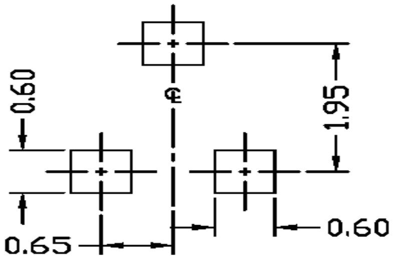
Figure 11. Transient Thermal Response Curve.

Package Information

SC70 PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

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°

NOTE

1. ALL DIMENSIONS ARE IN MILLMETERS.
2. DIMENSIONS ARE INCLUSIVE OF PLATING.
3. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
   MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 3 MILS EACH.
4. DIE IS FACING UP FOR MOLD AND FACING DOWN FOR TRIM/FORM.
   ie:REVERSE TRIM/FORM.
5. DIMENSION L IS MEASURED IN GAUGE PLANE.
6. CONTROLLING DIMENSION IS MILLIMETER.
   CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.