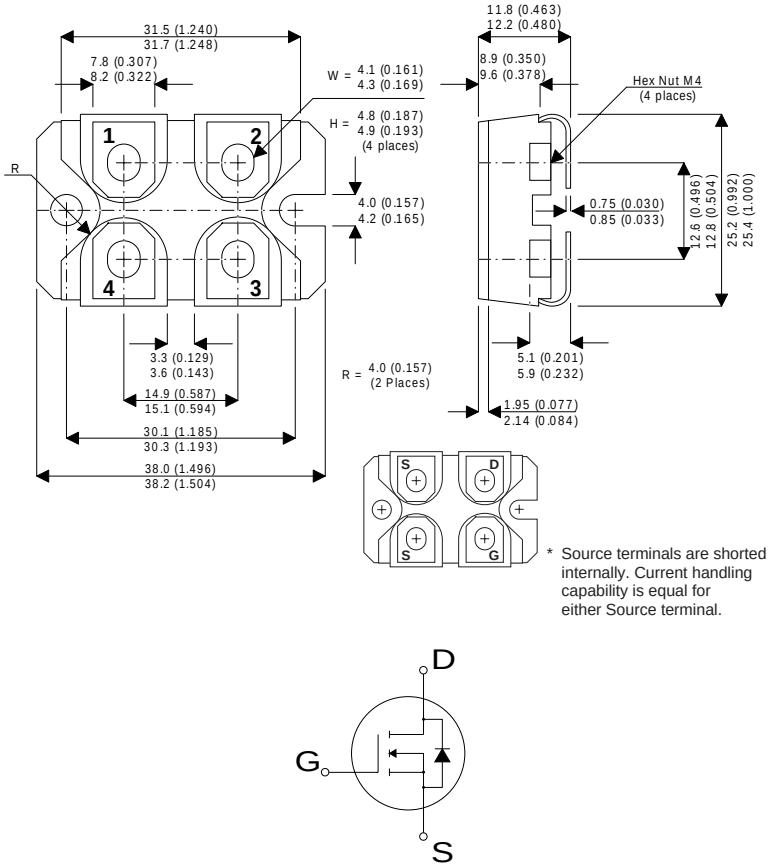
SML30J70F

SOT–227 Package Outline.

Dimensions in mm (inches)



N–CHANNEL ENHANCEMENT MODE HIGH VOLTAGE POWER FREDFET

V_{DSS} 300V

$I_{D(cont)}$ 70A

$R_{DS(on)}$ 0.040Ω

- **Faster Switching**
- **Lower Leakage**
- **100% Avalanche Tested**
- **Popular SOT–227 Package**
- **Fast Recovery Body Diode**

StarMOS is a new generation of high voltage N–Channel enhancement mode power MOSFETs. This new technology minimises the JFET effect, increases packing density and reduces the on-resistance. StarMOS also achieves faster switching speeds through optimised gate layout.

ABSOLUTE MAXIMUM RATINGS (T_{case} = 25°C unless otherwise stated)

V_{DSS}	Drain – Source Voltage	300	V
I_D	Continuous Drain Current	70	A
I_{DM}	Pulsed Drain Current [1]	280	A
V_{GS}	Gate – Source Voltage	±30	V
V_{GSM}	Gate – Source Voltage Transient	±40	
P_D	Total Power Dissipation @ T_{case} = 25°C	450	W
	Derate Linearly	3.6	W/°C
T_J , T_{STG}	Operating and Storage Junction Temperature Range	–55 to 150	°C
T_L	Lead Temperature : 0.063” from Case for 10 Sec.	300	
I_{AR}	Avalanche Current[1] (Repetitive and Non-Repetitive)	70	A
E_{AR}	Repetitive Avalanche Energy [1]	50	mJ
E_{AS}	Single Pulse Avalanche Energy [2]	2500	

1) Repetitive Rating: Pulse Width limited by maximum junction temperature.

2) Starting T_J = 25°C, L = 1.02mH, R_G = 25Ω, Peak I_L = 70A

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SEME LAB

SML30J70F

STATIC ELECTRICAL RATINGS (T_{case} = 25°C unless otherwise stated)

	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain – Source Breakdown Voltage	V_{GS} = 0V , I_D = 250µA	300			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0V)	V_{DS} = V_{DSS}			250	µA
		V_{DS} = 0.8V_{DSS} , T_C = 125°C			1000	
I_{GSS}	Gate – Source Leakage Current	V_{GS} = ±30V , V_{DS} = 0V			±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS} , I_D = 2.5mA	2		4	V
$I_{D(ON)}$	On State Drain Current [2]	V_{DS} > $I_{D(ON)}$ x $R_{DS(ON)}$ Max, V_{GS} = 10V	70			A
$R_{DS(ON)}$	Drain – Source On State Resistance [2]	V_{GS} = 10V , I_D = 0.5 I_D [Cont.]			0.040	Ω

DYNAMIC CHARACTERISTICS

	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	V_{GS} = 0V		8500	10200	pF
C_{oss}	Output Capacitance	V_{DS} = 25V		1500	2100	
C_{rss}	Reverse Transfer Capacitance	f = 1MHz		390	585	
Q_g	Total Gate Charge[3]	V_{GS} = 10V		285	425	nC
Q_{gs}	Gate – Source Charge	V_{DD} = 0.5 V_{DSS}		56	85	
Q_{gd}	Gate – Drain (“Miller”) Charge	I_D = I_D [Cont.] @ 25°C		120	180	
$t_{d(on)}$	Turn–on Delay Time	V_{GS} = 15V		16	32	ns
t_r	Rise Time	V_{DD} = 0.5 V_{DSS}		20	40	
$t_{d(off)}$	Turn-off Delay Time	I_D = I_D [Cont.] @ 25°C		48	72	
t_f	Fall Time	R_G = 1.8Ω		4	8	

SOURCE – DRAIN DIODE RATINGS AND CHARACTERISTICS

	Characteristic	Test Conditions		Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	(Body Diode)				70	A
I_{SM}	Pulsed Source Current[1]	(Body Diode)				280	
V_{SD}	Diode Forward Voltage[2]	V_{GS} = 0V , I_S = – I_D [Cont.]				1.3	V
dv / dt	Peak Diode Recovery	$I_S \le I_D$ [cont], $V_{DD} \le V_{DSS}$, $T_J \le 150°C$	dI / dt = 100A/µs, V_R = 200V, R_G = 2.0Ω			5	V/ns
t_{rr}	Reverse Recovery Time	I_S = – I_D [Cont.], dI / dt = 100A/µs	T_J = 25°C			240	ns
			T_J = 125°C			500	
Q_{rr}	Reverse Recovery Charge	I_S = – I_D [Cont.], dI / dt = 100A/µs	T_J = 25°C		1.1		µC
			T_J = 125°C		5.2		
I_{rrm}	Peak Recovery Current	I_S = – I_D [Cont.], dI / dt = 100A/µs	T_J = 25°C		12		A
			T_J = 125°C		22		

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THERMAL/PACKAGE CHARACTERISTICS

	Characteristic	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Junction to Case			0.42	°C/W
$R_{\theta JA}$	Junction to Ambient			40	
$V_{isolation}$	RMS Voltage (50 - 60 Hz Sinusoidal Waveform From Terminals to Mounting Base for 1 Min)	2500			V
Torque	Maximum Torque for Device Mounting Screws and Electrical Terminations.			13	lb in

1) Repetitive Rating: Pulse Width limited by maximum junction temperature.
2) Pulse Test: Pulse Width < 380μS , Duty Cycle < 2%
3) See MIL–STD–750 Method 3471

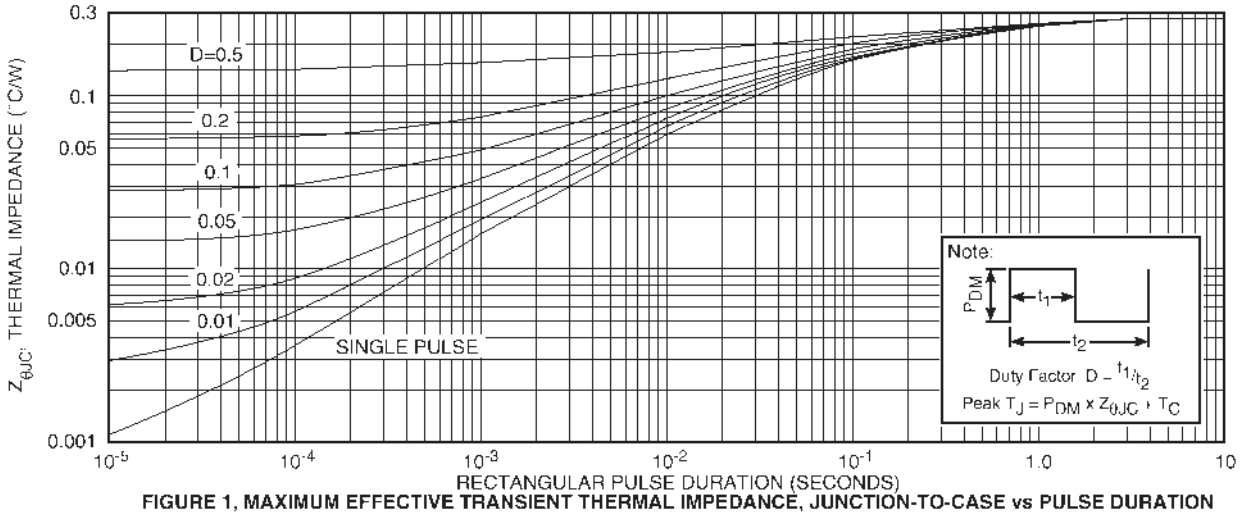

FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

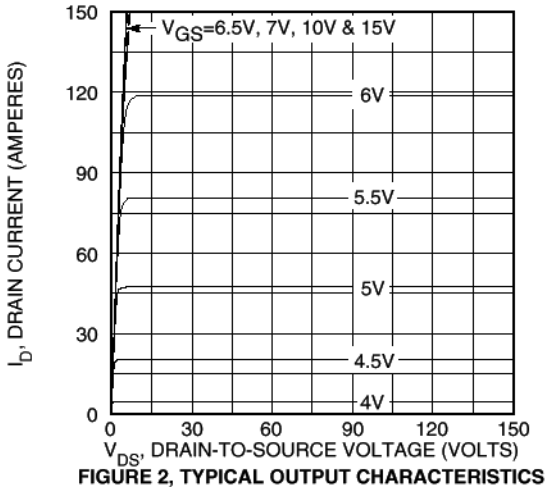

FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

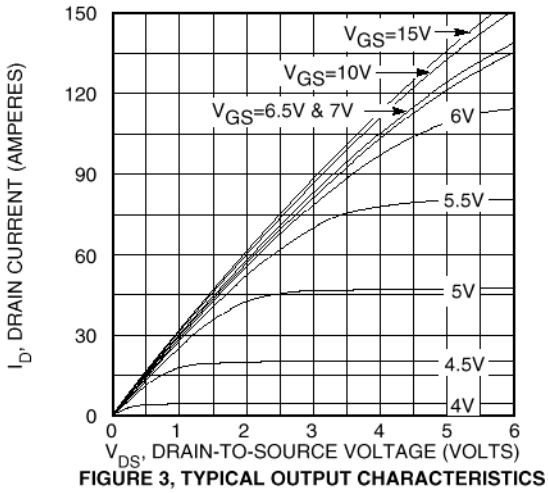

FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

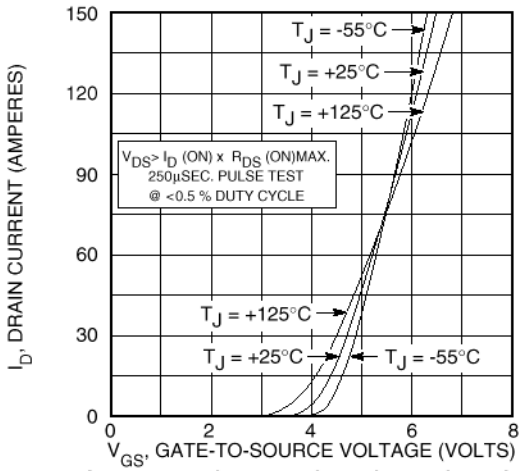

FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

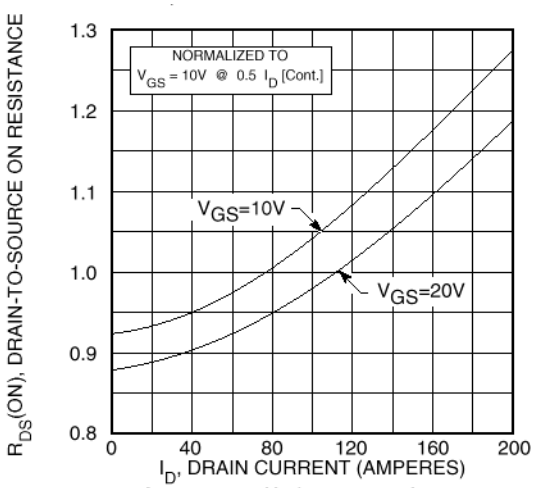

FIGURE 5, R_{DS}(ON) vs DRAIN CURRENT

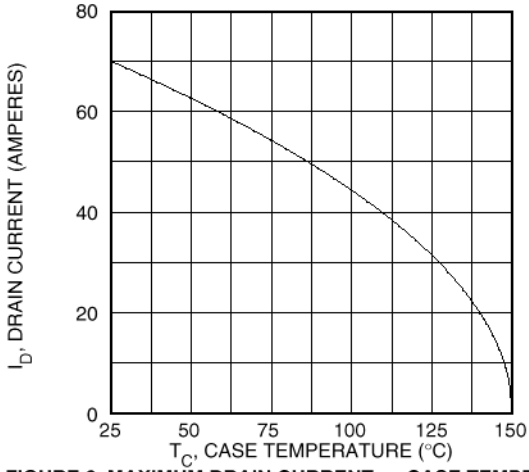

FIGURE 6, MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

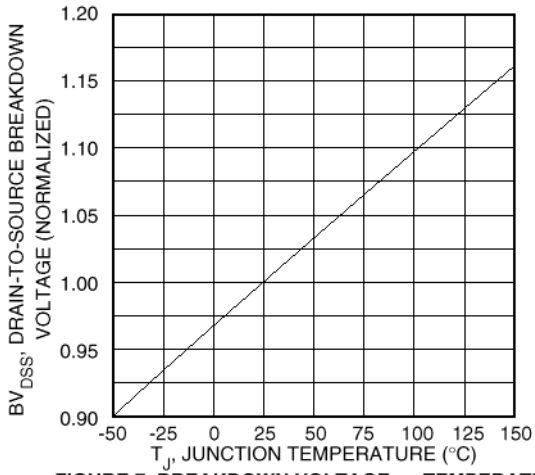

FIGURE 7, BREAKDOWN VOLTAGE vs TEMPERATURE

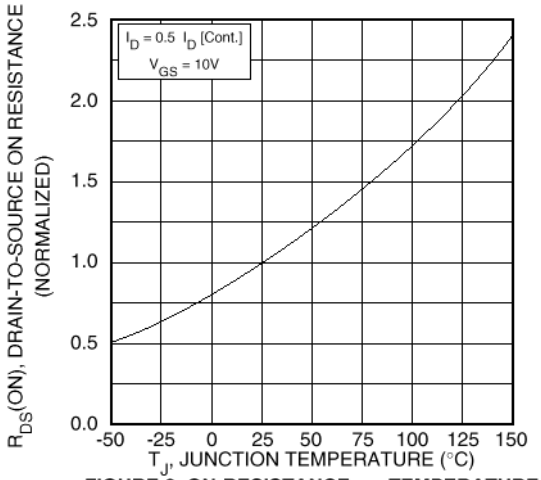

FIGURE 8, ON-RESISTANCE vs. TEMPERATURE

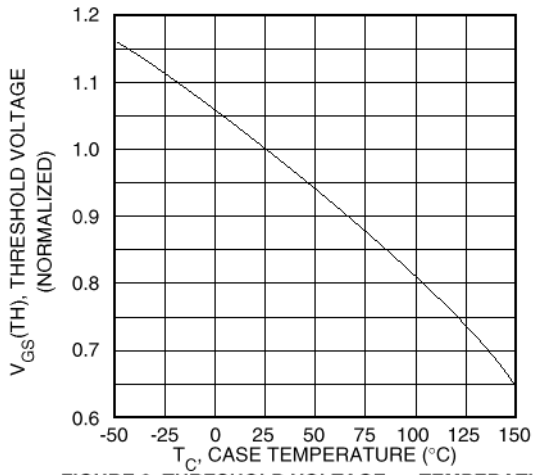

FIGURE 9, THRESHOLD VOLTAGE vs TEMPERATURE

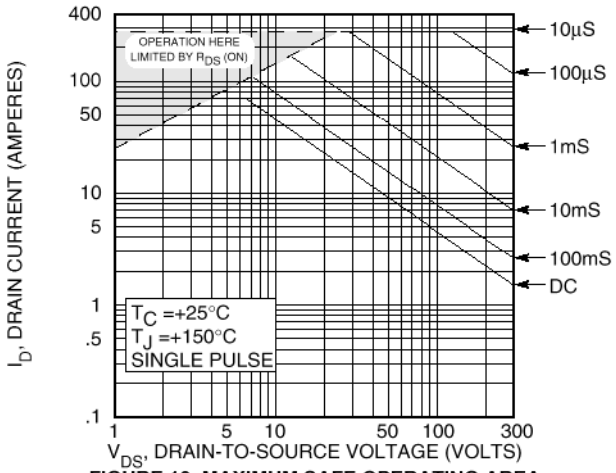

FIGURE 10, MAXIMUM SAFE OPERATING AREA

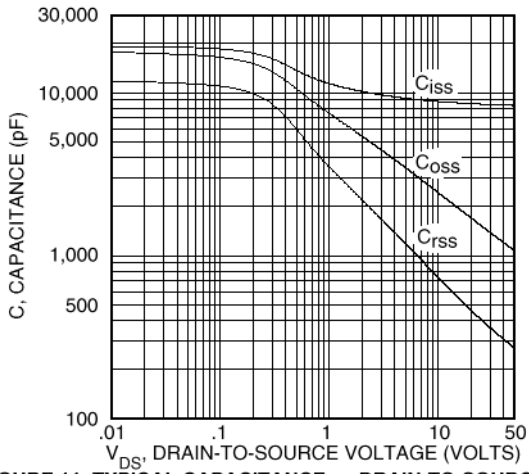

FIGURE 11, TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

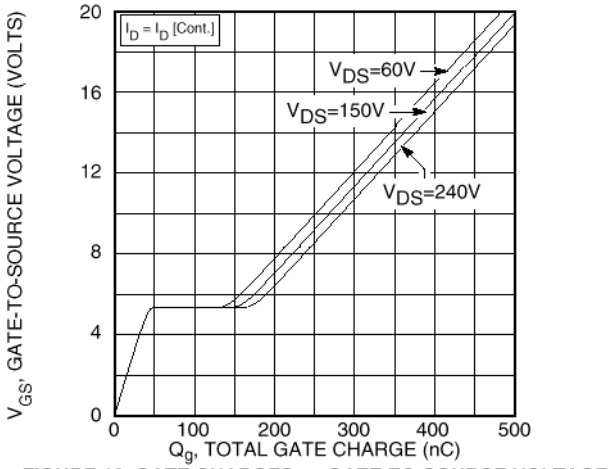

FIGURE 12, GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

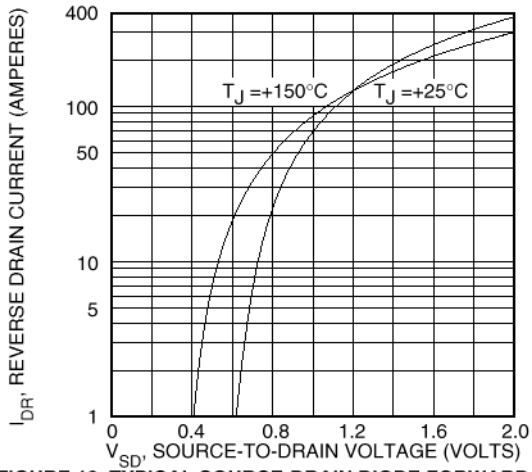

FIGURE 13, TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE

CAUTION — Electrostatic Sensitive Devices. Anti-Static Procedures Must Be Followed.