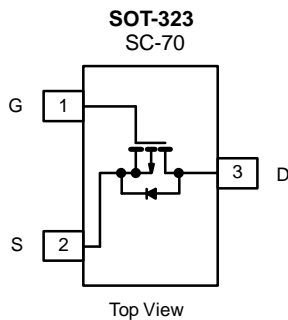


## 5LP01M-VB Datasheet

### P-Channel 60 V (D-S) MOSFET

#### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$V_{GS(th)}$ (V)	$I_D$ (mA)
- 60	4 at $V_{GS} = - 10$ V	- 1 to - 3	- 135



#### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET<sup>®</sup> Power MOSFET
- High-Side Switching
- Low On-Resistance: 4  $\Omega$
- Low Threshold: - 2 V (typ.)
- Fast Switching Speed: 20 ns (typ.)
- Low Input Capacitance: 20 pF (typ.)
- Compliant to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
Available

#### APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Display, Memories, Transistors, etc.
- Battery Operated Systems
- Power Supply Converter Circuits
- Solid-State Relays

#### BENEFITS

- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Easily Driven without Buffer

#### ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	- 60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>a</sup>	$I_D$	$T_A = 25$ °C	- 135
		$T_A = 100$ °C	- 105
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	- 800	mA
Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25$ °C	350
		$T_A = 100$ °C	140
Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	350	°C/W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	°C

Notes:

a. Surface mounted on FR4 board.

b. Pulse width limited by maximum junction temperature.

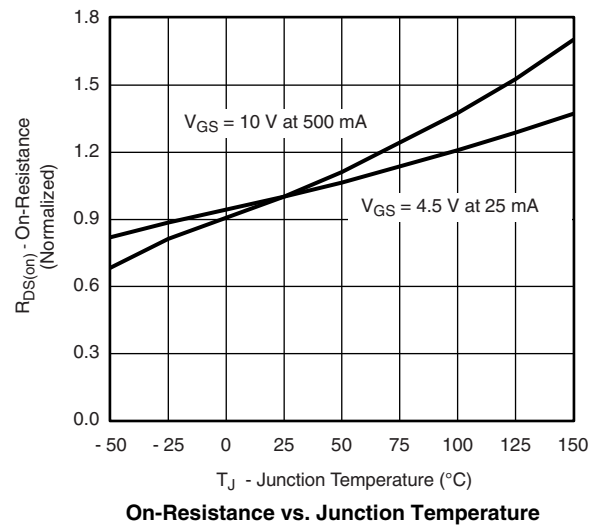
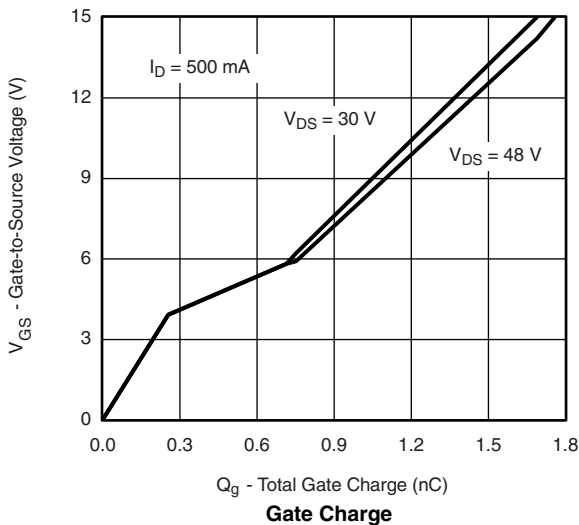
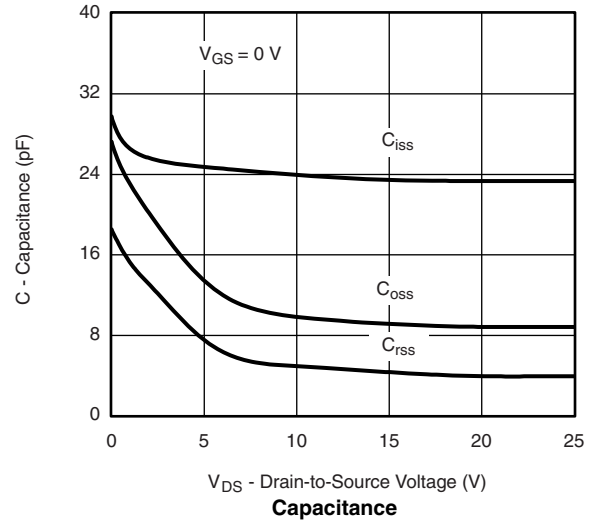
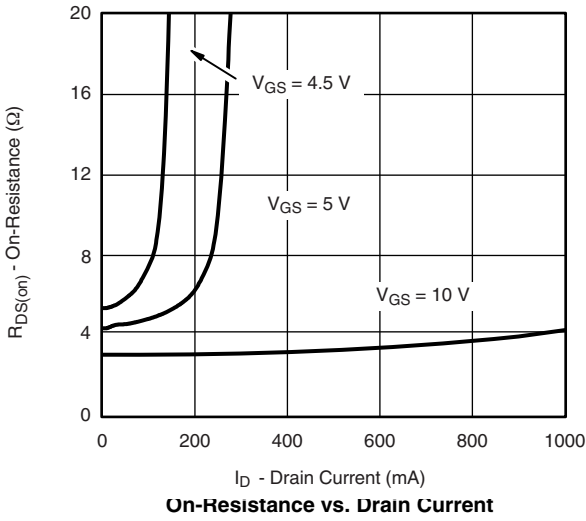
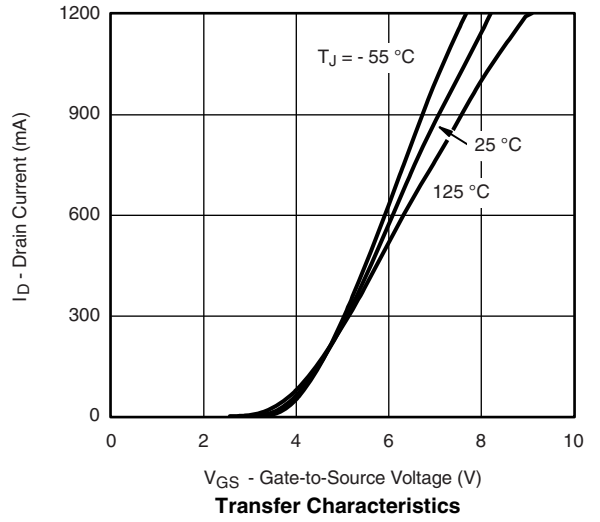
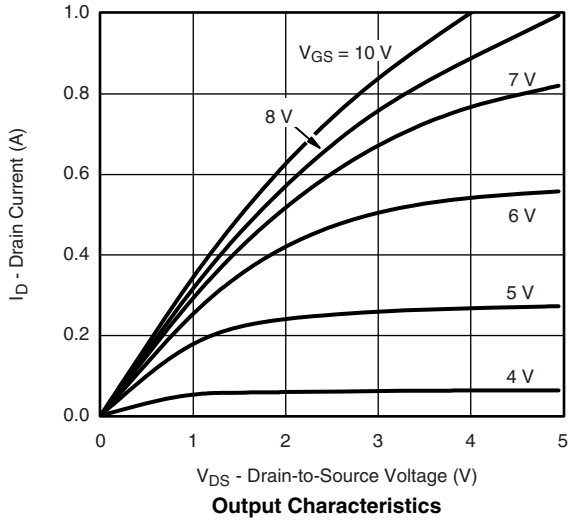
<b>SPECIFICATIONS</b> $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ. <sup>a</sup>	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -10\text{ }\mu\text{A}$	- 60			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1		- 3	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 10$	$\mu\text{A}$
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			$\pm 200$	
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}, T_J = 85\text{ }^\circ\text{C}$			$\pm 500$	nA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$			$\pm 100$	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			- 25	
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			- 250	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{GS} = -10\text{ V}, V_{DS} = -4.5\text{ V}$	- 50			mA
		$V_{GS} = -10\text{ V}, V_{DS} = -10\text{ V}$	- 600			
Drain-Source On-Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -25\text{ mA}$		5		$\Omega$
		$V_{GS} = -10\text{ V}, I_D = -100\text{ mA}$		4		
		$V_{GS} = -10\text{ V}, I_D = -100\text{ mA}, T_J = 125\text{ }^\circ\text{C}$			9	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -10\text{ V}, I_D = -100\text{ mA}$	80			mS
Diode Forward Voltage	$V_{SD}$	$I_S = -100\text{ mA}, V_{GS} = 0\text{ V}$			- 1.4	V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS} = -30\text{ V}, V_{GS} = -15\text{ V}$ $I_D \cong -100\text{ mA}$		1.7		nC
Gate-Source Charge	$Q_{gs}$			0.26		
Gate-Drain Charge	$Q_{gd}$			0.46		
Input Capacitance	$C_{iss}$	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$		23		pF
Output Capacitance	$C_{oss}$			10		
Reverse Transfer Capacitance	$C_{rss}$			5		
<b>Switching<sup>b</sup></b>						
Turn-On Time	$t_{d(on)}$	$V_{DD} = -25\text{ V}, R_L = 150\text{ }\Omega$ $I_D \cong -200\text{ mA}, V_{GEN} = -10\text{ V}, R_g = 10\text{ }\Omega$		20		ns
Turn-Off Time	$t_{d(off)}$			35		

Notes:

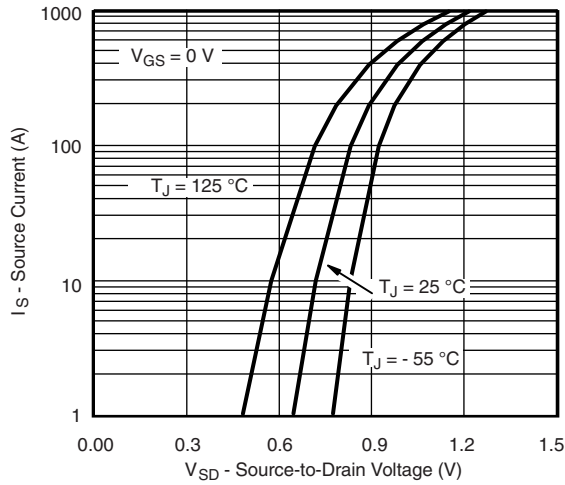
- a. Pulse test:  $PW \leq 300\text{ }\mu\text{s}$  duty cycle  $\leq 2\%$ .  
 b. Switching time is essentially independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

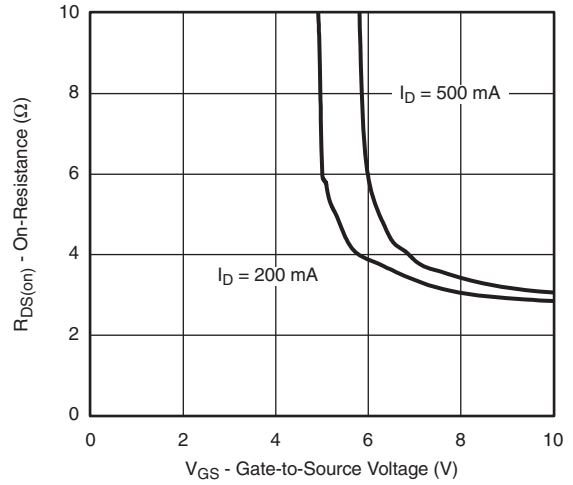
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



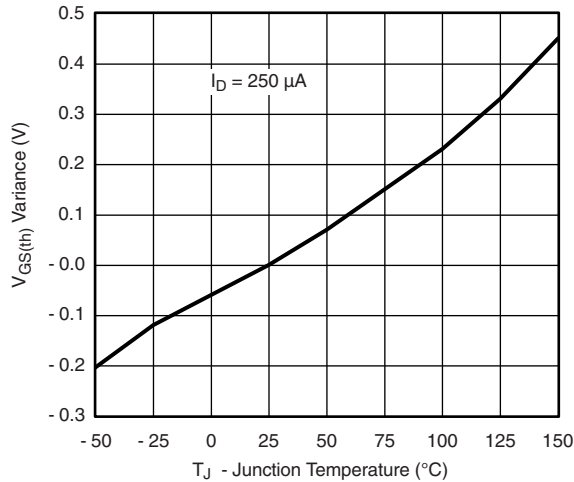
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



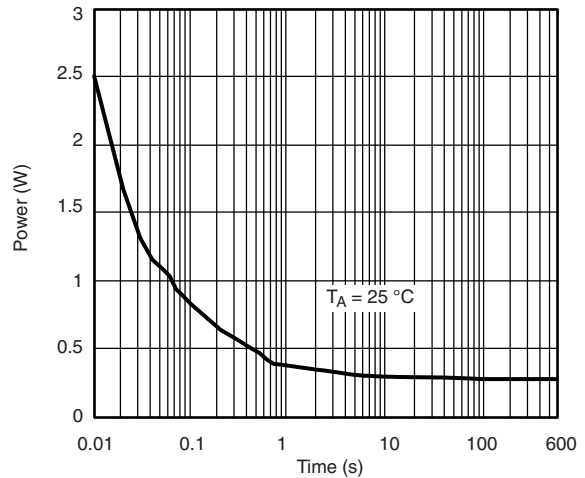
Source-Drain Diode Forward Voltage



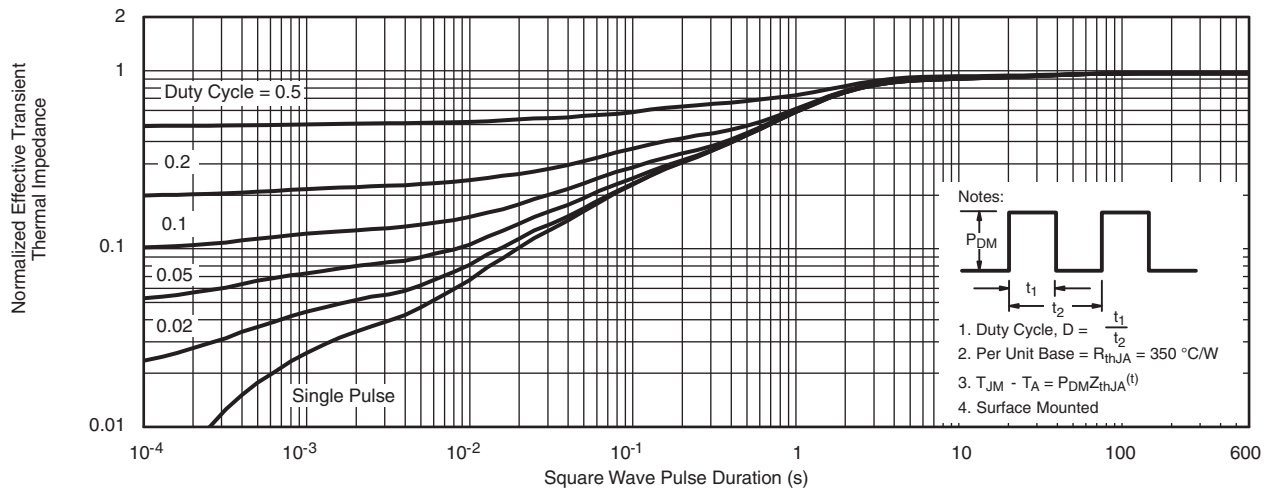
On-Resistance vs. Gate-Source Voltage



Threshold Voltage Variance Over Temperature



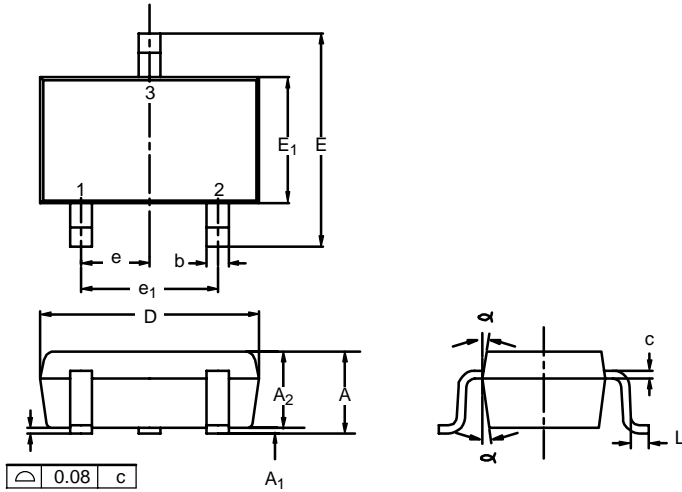
Single Pulse Power, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient

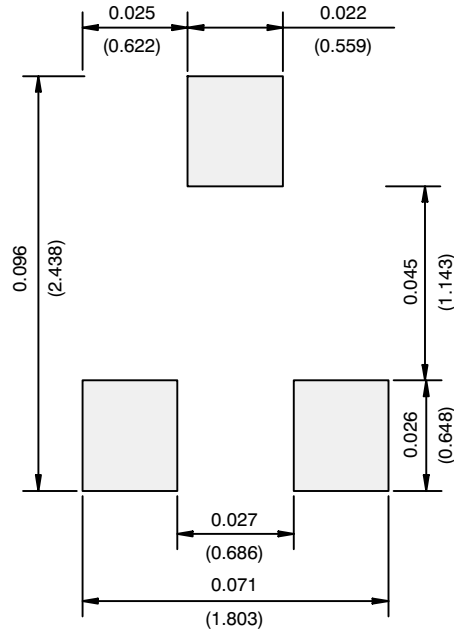
- Notes:
- Duty Cycle,  $D = \frac{t_1}{t_2}$
  - Per Unit Base =  $R_{thJA} = 350\text{ }^{\circ}\text{C/W}$
  - $T_{JM} - T_A = P_{DM} Z_{thJA}^{(t)}$
  - Surface Mounted

**SC-70: 3-LEADS**



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
<b>A</b>	0.90	-	1.10	0.035	-	0.043
<b>A<sub>1</sub></b>	-	-	0.10	-	-	0.004
<b>A<sub>2</sub></b>	0.80	-	1.00	0.031	-	0.039
<b>b</b>	0.25	-	0.40	0.010	-	0.016
<b>c</b>	0.10	-	0.25	0.004	-	0.010
<b>D</b>	1.80	2.00	2.20	0.071	0.079	0.087
<b>E</b>	1.80	2.10	2.40	0.071	0.083	0.094
<b>E<sub>1</sub></b>	1.15	1.25	1.35	0.045	0.049	0.053
<b>e</b>	0.65BSC			0.026BSC		
<b>e<sub>1</sub></b>	1.20	1.30	1.40	0.047	0.051	0.055
<b>L</b>	0.10	0.20	0.30	0.004	0.008	0.012
$\alpha$	7°Nom			7°Nom		
ECN: S-03946—Rev. C, 09-Jul-01 DWG: 5549						

RECOMMENDED MINIMUM PADS FOR SC-70: 3-Lead



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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