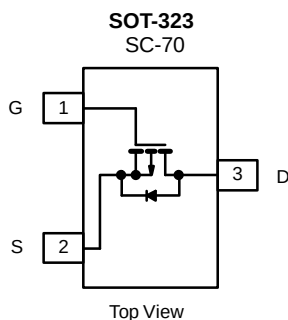


5HP02M-VB Datasheet

P-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	$V_{GS(th)}$ (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
- Trench Power MOSFET
- High-Side Switching
- Low On-Resistance: 4 Ω
- 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 $T_A = 25^\circ\text{C}$, unless otherwise noted

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

Notes:

a. Surface mounted on FR4 board.

b. Pulse width limited by maximum junction temperature.

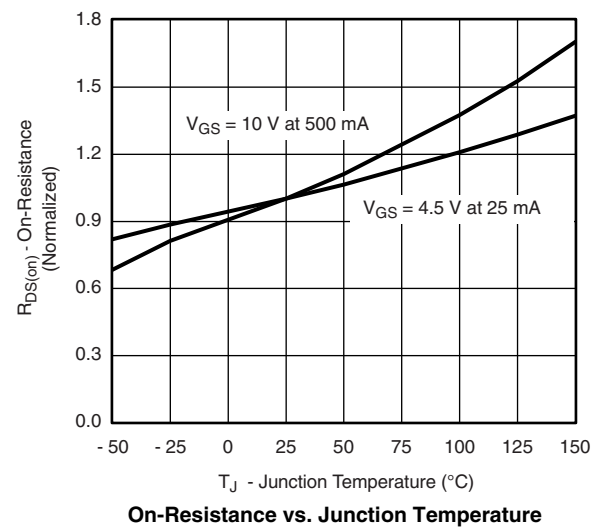
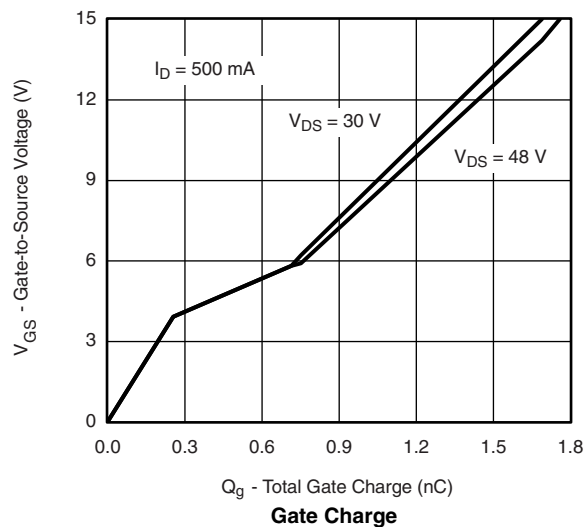
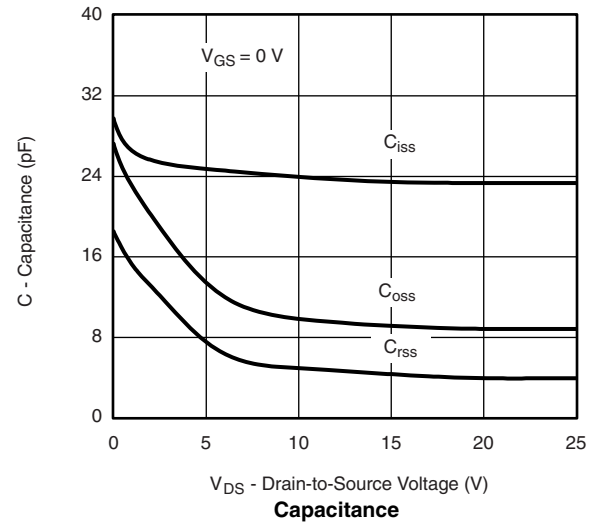
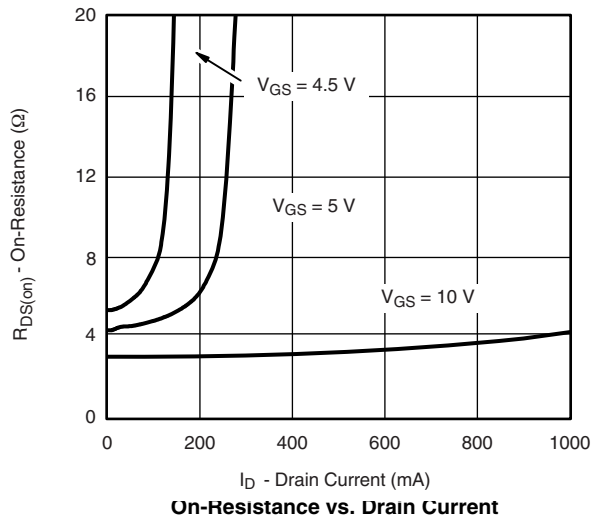
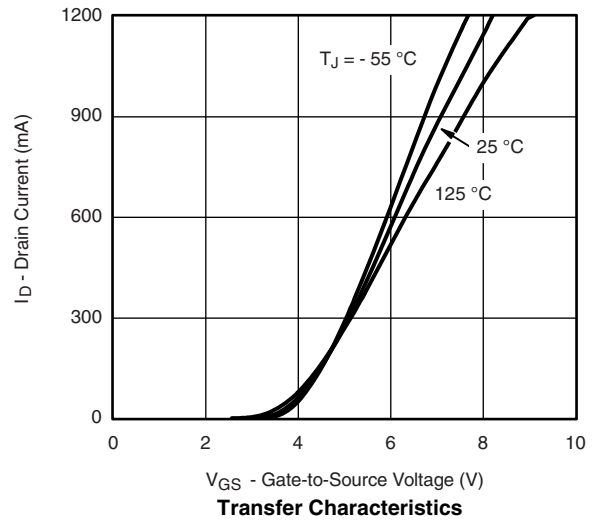
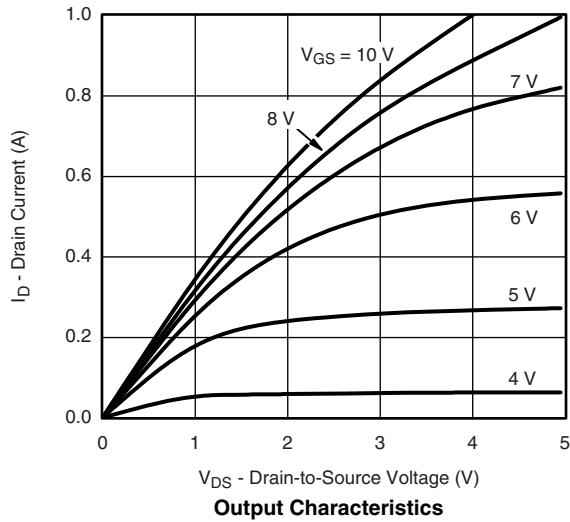
SPECIFICATIONS T _A = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ. ^a	Max.	
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 10 μA	- 60			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1		- 3	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 10	μA
		V _{DS} = 0 V, V _{GS} = ± 10 V			± 200	nA
		V _{DS} = 0 V, V _{GS} = ± 10 V, T _J = 85 °C			± 500	
		V _{DS} = 0 V, V _{GS} = ± 5 V			± 100	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 60 V, V _{GS} = 0 V			- 25	
		V _{DS} = - 60 V, V _{GS} = 0 V, T _J = 85 °C			- 250	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = - 10 V, V _{DS} = - 4.5 V	- 50			mA
		V _{GS} = - 10 V, V _{DS} = - 10 V	- 600			
Drain-Source On-Resistance ^a	R _{DS(on)}	V _{GS} = - 4.5 V, I _D = - 25 mA		5		Ω
		V _{GS} = - 10 V, I _D = - 100 mA		4		
		V _{GS} = - 10 V, I _D = - 100 mA, T _J = 125 °C			9	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 10 V, I _D = - 100 mA	80			mS
Diode Forward Voltage	V _{SD}	I _S = - 100 mA, V _{GS} = 0 V			- 1.4	V
Dynamic						
Total Gate Charge	Q _g	V _{DS} = - 30 V, V _{GS} = - 15 V I _D ≅ - 100 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 V, V _{GS} = 0 V f = 1 MHz		23		pF
Output Capacitance	C _{oss}			10		
Reverse Transfer Capacitance	C _{rss}			5		
Switching ^b						
Turn-On Time	t _{d(on)}	V _{DD} = - 25 V, R _L = 150 Ω I _D ≅ - 200 mA, V _{GEN} = - 10 V, R _g = 10 Ω		20		ns
Turn-Off Time	t _{d(off)}			35		

Notes:

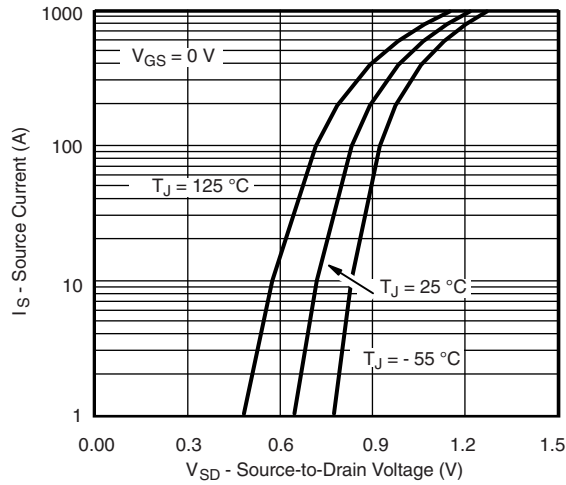
a. Pulse test: $PW \leq 300\text{ }\mu\text{s}$ duty cycle $\leq 2\%$.

b. Switching time is essentially independent of operating temperature.

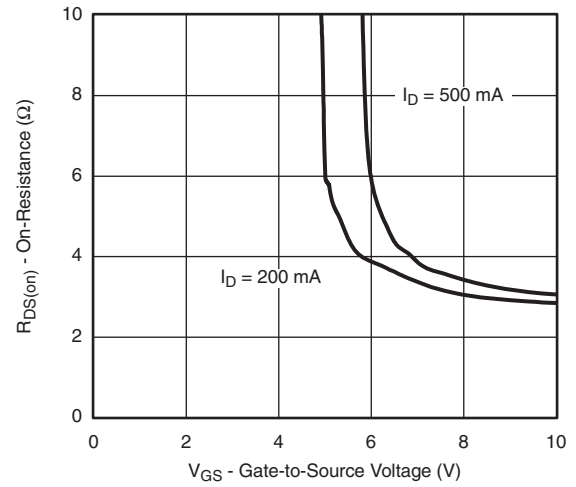
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


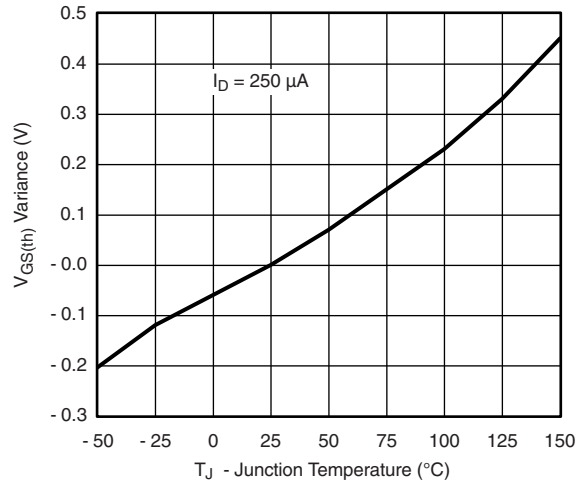
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



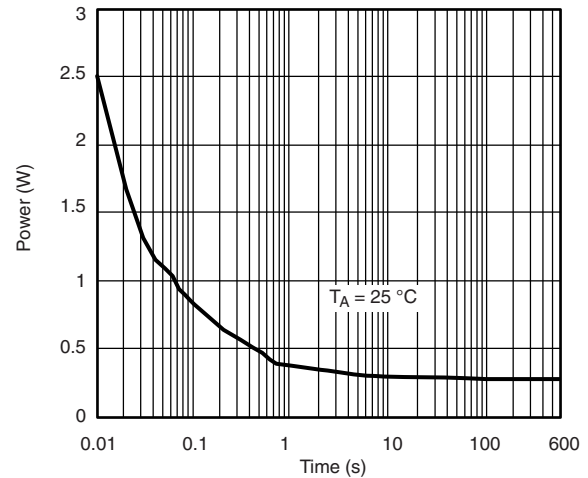
Source-Drain Diode Forward Voltage



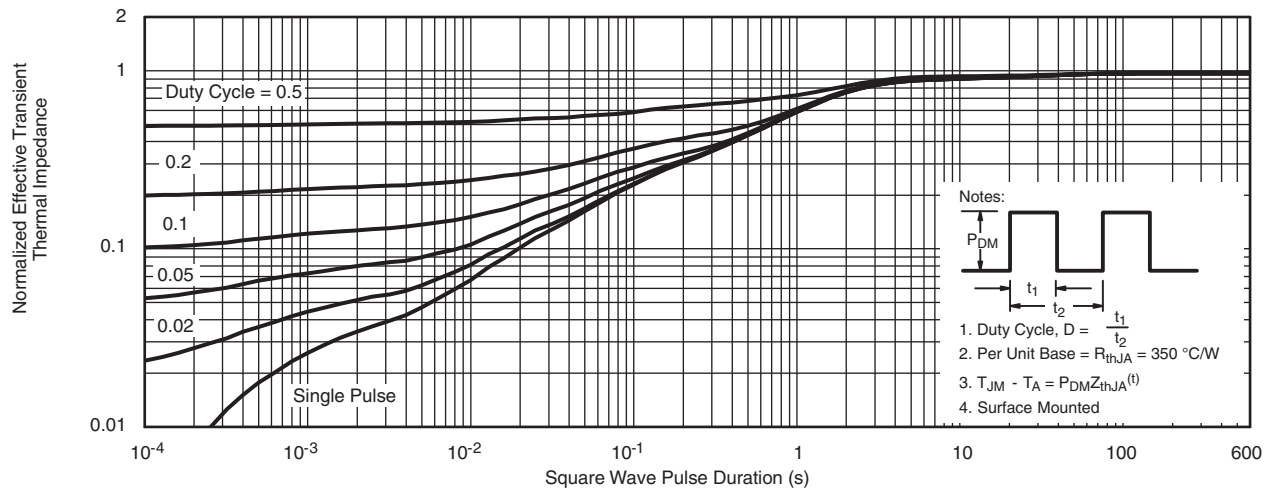
On-Resistance vs. Gate-Source Voltage



Threshold Voltage Variance Over Temperature



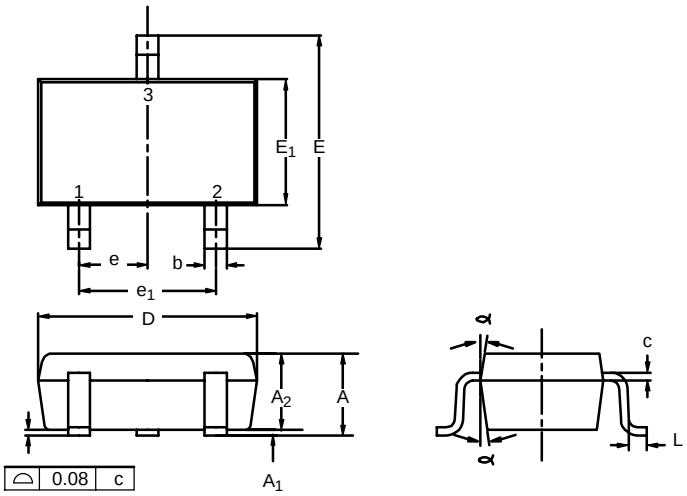
Single Pulse Power, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient

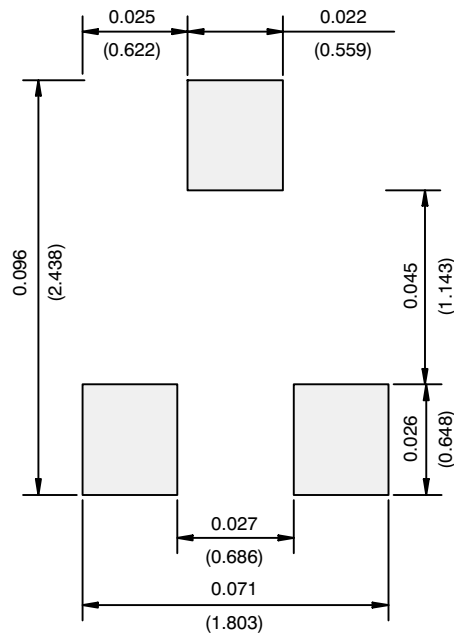
- Notes:
1. Duty Cycle, $D = \frac{t_1}{t_2}$
 2. Per Unit Base = $R_{thJA} = 350^\circ C/W$
 3. $T_{JM} - T_A = P_{DM} Z_{thJA}^{(t)}$
 4. Surface Mounted

SC-70: 3-LEADS



	MILLIMETERS			INCHES		
Dim	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	0.25	—	0.40	0.010	—	0.016
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
α	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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