P-Channel 60 V (D-S) MOSFET

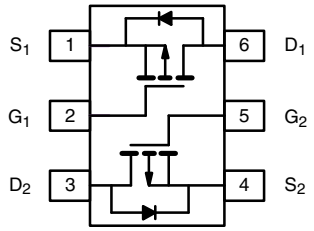
PRODUCT SUMMARY			
$V_{DS\ (min)}$ (V)	$R_{DS(on)}$ (Ω)	$V_{GS(th)}$ (V)	I_D (mA)
- 60	4 at V_{GS} = - 10 V	- 1 to - 3.0	- 500

FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFETs
- High-Side Switching
- Low On-Resistance: 4 Ω
- Low Threshold: - 2 V (typ.)
- Fast Switching Speed: 20 ns (typ.)
- Low Input Capacitance: 23 pF (typ.)
- Miniature Package
- Gate-Source ESD Protected: 2000 V
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE

SC-89



Top View

Marking Code: D

Ordering Information: Si1025X-T1-GE3 (Lead (Pb)-free and Halogen-free)

BENEFITS

- Ease in Driving Switches
- Low Offset Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Easily Driven Without Buffer
- Small Board Area

APPLICATIONS

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

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)

Parameter		Symbol	5 s	Steady State	Unit
Drain-Source Voltage		V_{DS}	- 60		V
Gate-Source Voltage		V_{GS}	± 20		V
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	- 200	- 190	mA
	T_A = 85 °C		- 145	- 135	
Pulsed Drain Current[b]		I_{DM}	- 650		mA
Continuous Source Current (Diode Conduction)[a]		I_S	- 450	- 380	mA
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	280	250	mW
	T_A = 85 °C		145	130	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		°C
Gate-Source ESD Rating (HBM, Method 3015)		ESD	2000		V

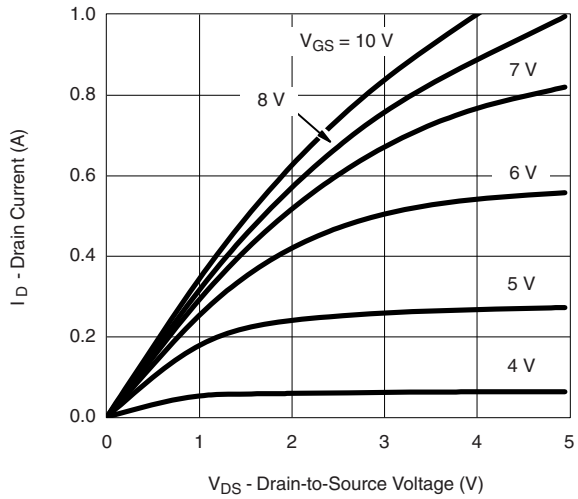
Notes:
a. Surface mounted on FR4 board.
b. Pulse width limited by maximum junction temperature.

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
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 = - 0.25 mA	- 1		- 3.0	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 10 V			± 200	nA
		V_{DS} = 0 V, V_{GS} = ± 5 V			± 100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 50 V, V_{GS} = 0 V			- 25	
		V_{DS} = - 50 V, V_{GS} = 0 V, T_J = 85 °C			- 250	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = - 10 V, V_{GS} = - 4.5 V	- 50			mA
		V_{DS} = - 10 V, V_{GS} = - 10 V	- 600			
Drain-Source On-Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 25 mA			8	Ω
		V_{GS} = - 10 V, I_D = - 500 mA			4	
		V_{GS} = - 10 V, I_D = - 500 mA, T_J = 125 °C			6	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 100 mA		100		mS
Diode Forward Voltage[a]	V_{SD}	I_S = - 200 mA, V_{GS} = 0 V			- 1.4	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = - 30 V, V_{GS} = - 15 V, $I_D \cong$ - 500 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, c]						
Turn-On Time	t_{ON}	V_{DD} = - 25 V, R_L = 150 Ω, $I_D \cong$ - 165 mA, V_{GEN} = - 10 V, R_g = 10 Ω		20		ns
Turn-Off Time	t_{OFF}			35		

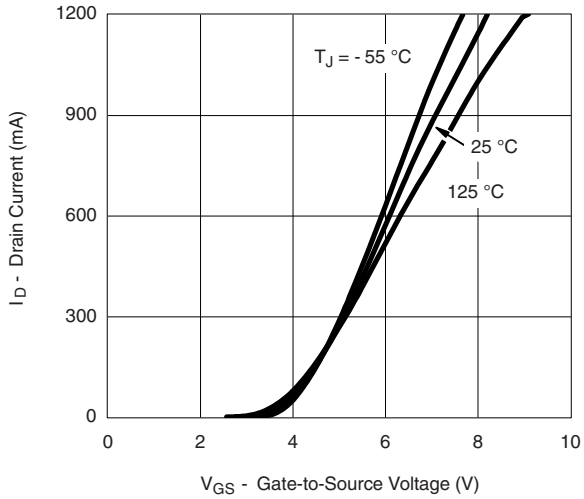
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. For DESIGN AID ONLY, not subject to production testing.
c. Switching time is essentially independent of operating temperature.

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 (T_A = 25 °C, unless otherwise noted)

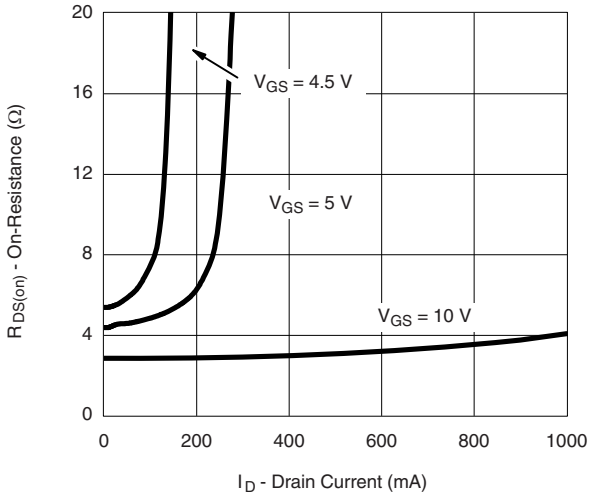


Output Characteristics

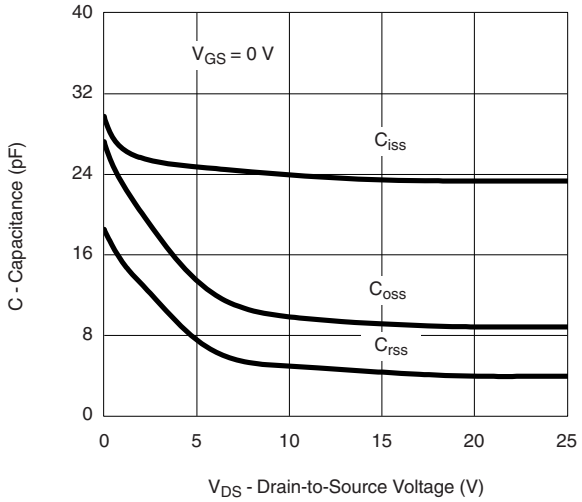


Transfer Characteristics

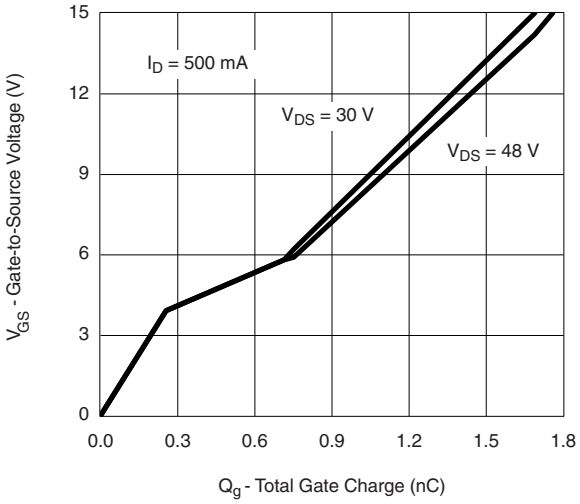
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



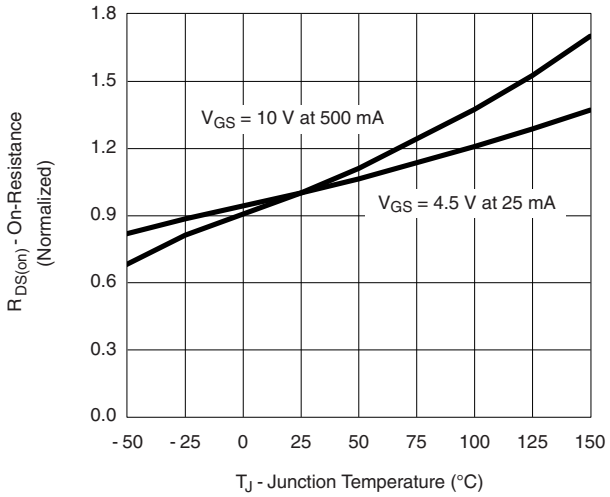
On-Resistance vs. Drain Current



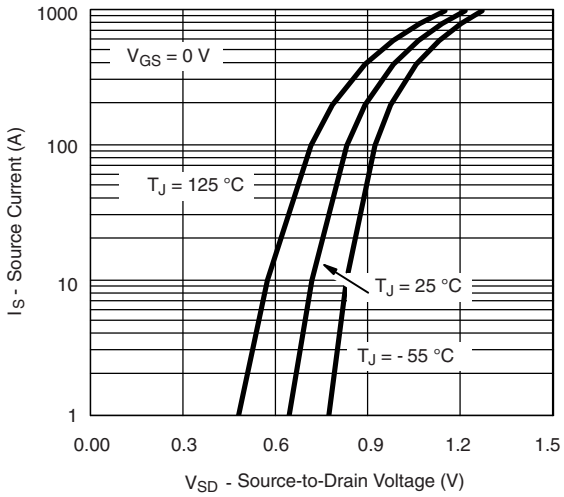
Capacitance



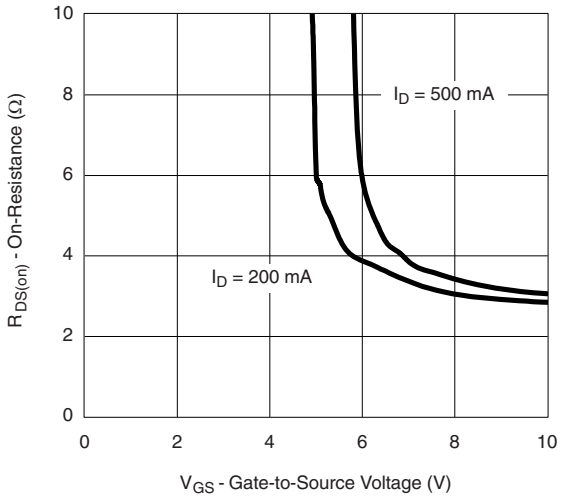
Gate Charge



On-Resistance vs. Junction Temperature

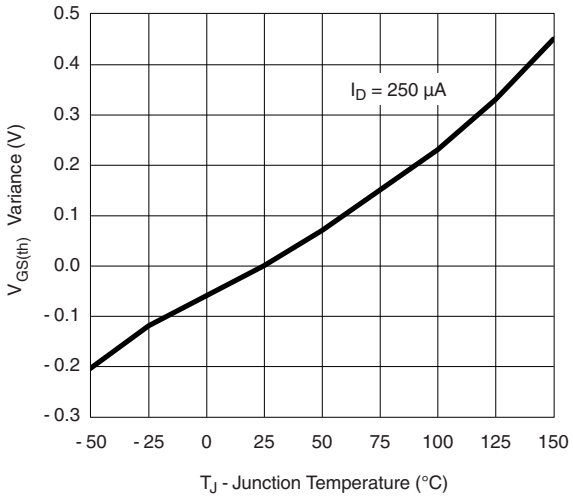


Source-Drain Diode Forward Voltage

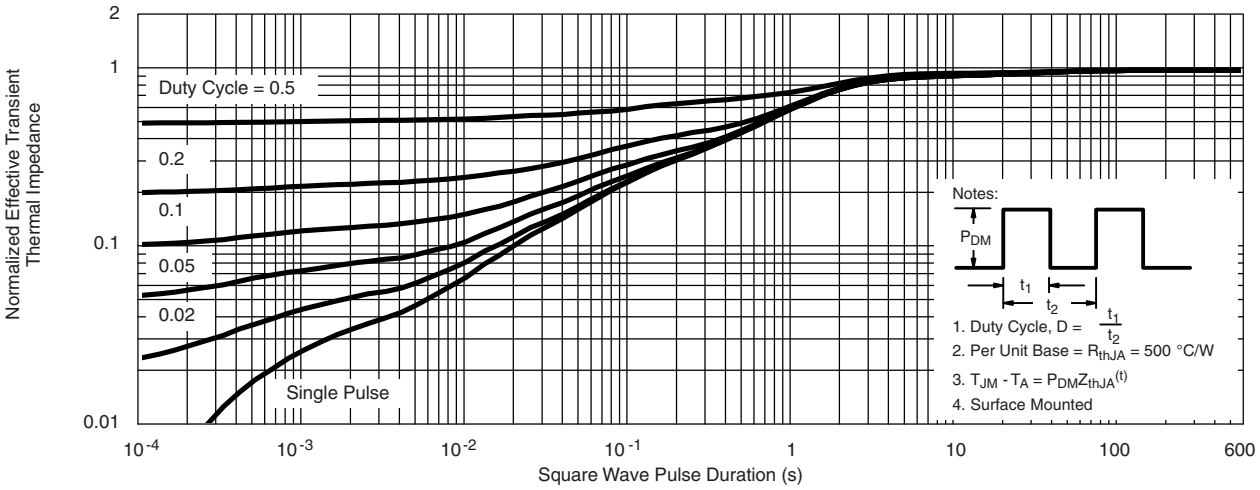


On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



Threshold Voltage Variance Over Temperature



Normalized Thermal Transient Impedance, Junction-to-Ambient

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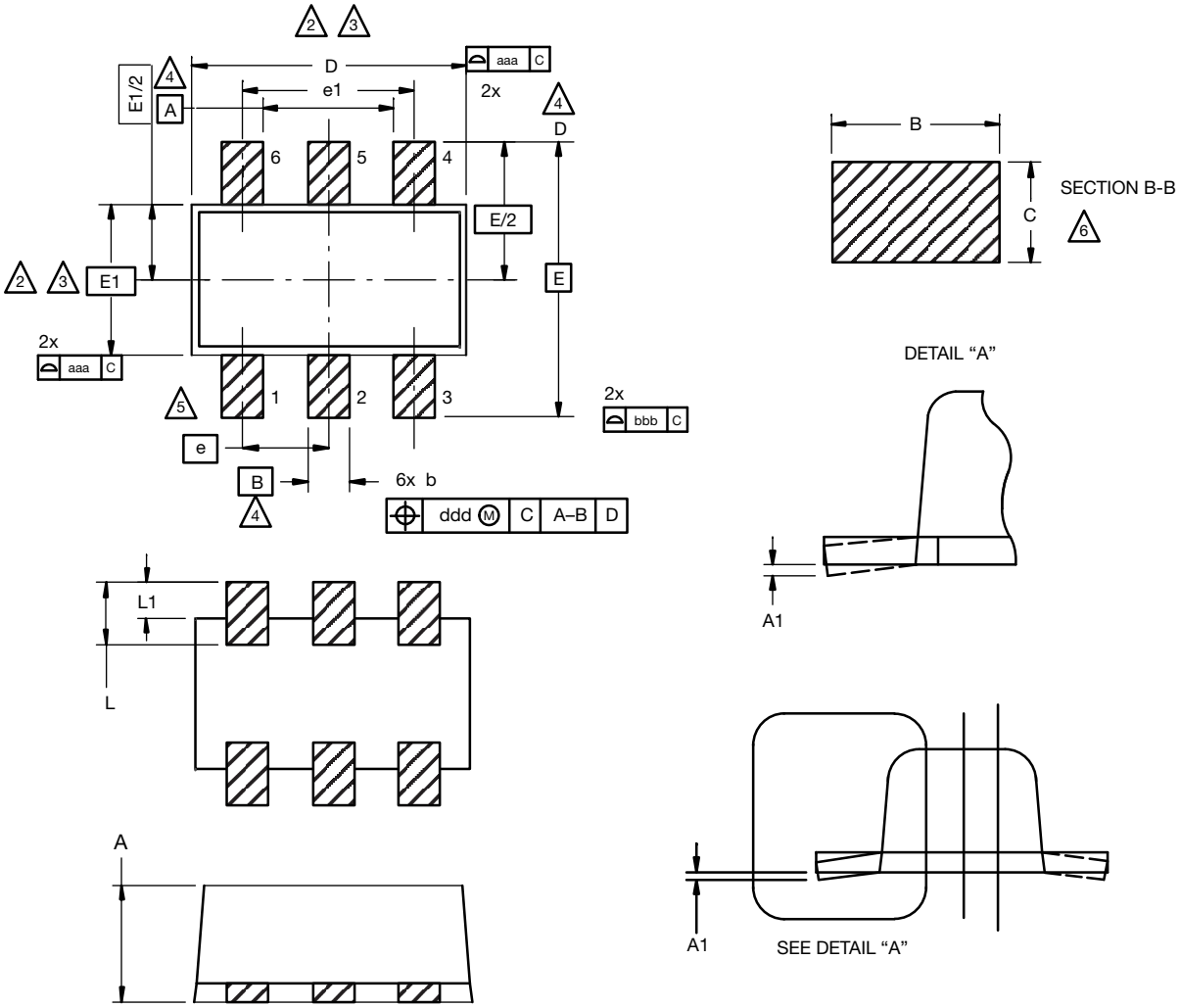
SC-89 6-Leads (SOT-563F)



Notes

1. Dimensions in millimeters.

2. Dimension D does not include mold flash, protrusions or gate burrs. Mold flush, protrusions or gate burrs shall not exceed 0.15 mm per dimension E1 does not include interlead flash or protrusion, interlead flash or protrusion shall not exceed 0.15 mm per side.

3. Dimensions D and E1 are determined at the outmost extremes of the plastic body exclusive of mold flash, the bar burrs, gate burrs and interlead flash, but including any mismatch between the top and the bottom of the plastic body.

4. Datums A, B and D to be determined 0.10 mm from the lead tip.

5. Terminal numbers are shown for reference only.

6. These dimensions apply to the flat section of the lead between 0.08 mm and 0.15 mm from the lead tip.

DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.56	0.58	0.60
A1	0	0.02	0.10
b	0.15	0.22	0.30
c	0.10	0.14	0.18
D	1.50	1.60	1.70
E	1.50	1.60	1.70
E1	1.15	1.20	1.25
e	0.45	0.50	0.55
e1	0.95	1.00	1.05
L	0.25	0.35	0.50
L1	0.10	0.20	0.30
C14-0439-Rev. C, 11-Aug-14 DWG: 5880			

For technical questions, contact: analogswitchtechsupport@vishay.com
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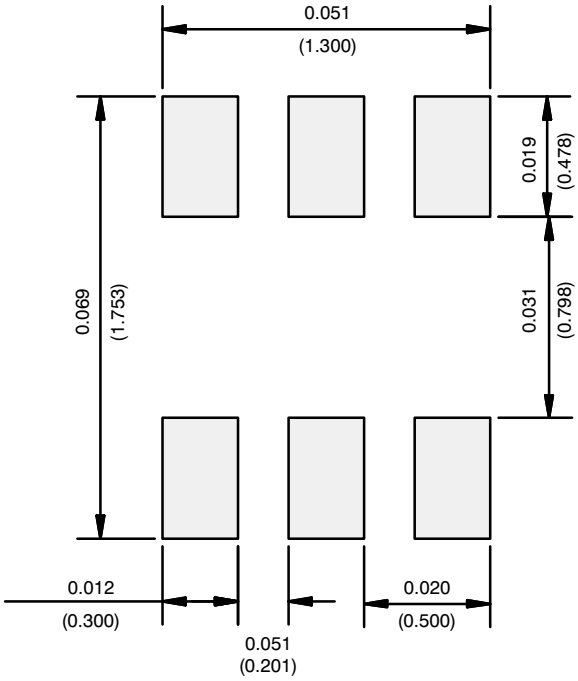
RECOMMENDED MINIMUM PADS FOR SC-89: 6-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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