

P-Channel 30 V (D-S) MOSFET with Schottky Diode

MOSFET PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
- 30	0.068 at $V_{GS} = - 10$ V	- 4.6	4.6
	0.110 at $V_{GS} = - 4.5$ V	- 3.4	

SCHOTTKY PRODUCT SUMMARY

V_{KA} (V)	V_F (V) Diode Forward Voltage	I_D (A) ^a
30	0.44 V at 1 A	2

FEATURES

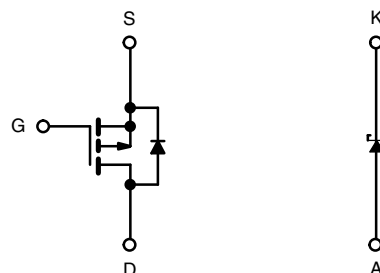
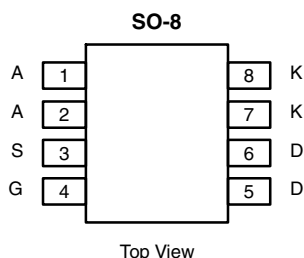
- Halogen-free According to IEC 61249-2-21 Definition
- LITTLE FOOT[®] Plus Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Battery Management in Notebook PC
- Non-synchronous Buck Converter in HDD



Ordering Information: Si4833BDY-T1-GE3 (Lead (Pb)-free and Halogen-free)

P-Channel MOSFET

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage (MOSFET)		V_{DS}	- 30	V
Reverse Voltage (Schottky)		V_{KA}	- 30	
Gate-Source Voltage (MOSFET)		V_{GS}	$\pm$ 20	
Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$) (MOSFET)	$T_C = 25\text{ }^{\circ}\text{C}$	I_D	- 4.6	A
	$T_C = 70\text{ }^{\circ}\text{C}$		- 3.6	
	$T_A = 25\text{ }^{\circ}\text{C}$		- 3.8 ^{b, c}	
	$T_A = 70\text{ }^{\circ}\text{C}$		- 3 ^{b, c}	
Pulsed Drain Current (MOSFET) (t = 300 μ s)		I_{DM}	- 20	
Continuous Source Current (MOSFET Diode Conduction)	$T_C = 25\text{ }^{\circ}\text{C}$	I_S	- 2	
	$T_A = 25\text{ }^{\circ}\text{C}$		- 1.4 ^{b, c}	
Average Forward Current (Schottky)		I_F	- 1.4 ^b	
Pulsed Forward Current (Schottky)		I_{FM}	- 2	
Maximum Power Dissipation (MOSFET and Schottky)	$T_C = 25\text{ }^{\circ}\text{C}$	P_D	2.75	W
	$T_C = 70\text{ }^{\circ}\text{C}$		1.75	
	$T_A = 25\text{ }^{\circ}\text{C}$		1.75 ^{b, c}	
	$T_A = 70\text{ }^{\circ}\text{C}$		1.10 ^{b, c}	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	$^{\circ}\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (MOSFET and Schottky) ^{b, c, d}	R_{thJA}	60	71.5	°C/W
Maximum Junction-to-Foot (Drain) (MOSFET and Schottky)	R_{thJF}	35	45	

Notes:

a. Based on $T_C = 25$ °C.

b. Surface mounted on FR4 board.

c. $t \leq 10$ s.

d. Maximum under steady state conditions is 120 °C/W.

MOSFET SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{DS} = 0 V, I _D = - 250 μA	- 30			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 20		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			3.9		
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1	- 1.8	- 2.5	V
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 30 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 30 V, V _{GS} = 0 V, T _J = 75 °C			- 10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ - 5 V, V _{GS} = - 10 V	- 5			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 3.6 A		0.055	0.068	Ω
		V _{GS} = - 4.5 V, I _D = - 2.8 A		0.092	0.110	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 3.6 A		6.5		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 15 V, V _{GS} = 0 V, f = 1 MHz		350		pF
Output Capacitance	C _{oss}			75		
Reverse Transfer Capacitance	C _{rss}			63		
Total Gate Charge	Q _g	V _{DS} = - 15 V, V _{GS} = - 10 V, I _D = - 5 A		9	14	nC
		V _{DS} = - 15 V, V _{GS} = - 4.5 V, I _D = - 5 A		4.6	7	
Gate-Source Charge	Q _{gs}			1.3		
Gate-Drain Charge	Q _{gd}			2.1		
Gate Resistance	R _g	f = 1 MHz	1.5	7.3	14.5	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 15 V, R _L = 3 Ω I _D ≅ - 5 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		28	50	ns
Rise Time	t _r			73	140	
Turn-Off Delay Time	t _{d(off)}			12	24	
Fall Time	t _f			8	16	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 15 V, R _L = 3 Ω I _D ≅ - 5 A, V _{GEN} = - 10 V, R _g = 1 Ω		6	12	
Rise Time	t _r			9	18	
Turn-Off Delay Time	t _{d(off)}			12	24	
Fall Time	t _f			6	12	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I _S	T _C = 25 °C			- 4.6	A
Pulse Diode Forward Current ^a	I _{SM}				- 20	
Body Diode Voltage	V _{SD}	I _S = - 2 A, V _{GS} = 0 V		- 0.83	- 1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 2 A, dI/dt = 100 A/μs, T _J = 25 °C		12	24	ns
Body Diode Reverse Recovery Charge	Q _{rr}			6	12	nC
Reverse Recovery Fall Time	t _a			8		ns
Reverse Recovery Rise Time	t _b			4		

Notes:

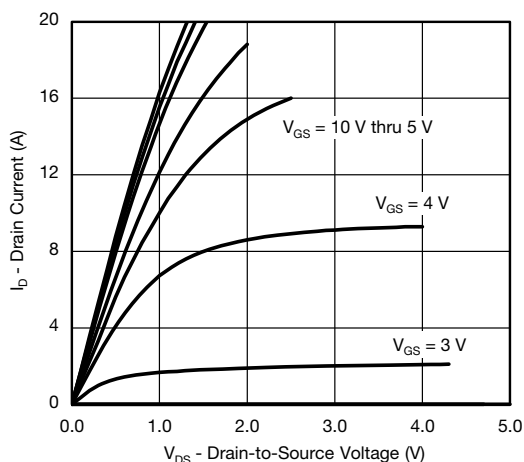
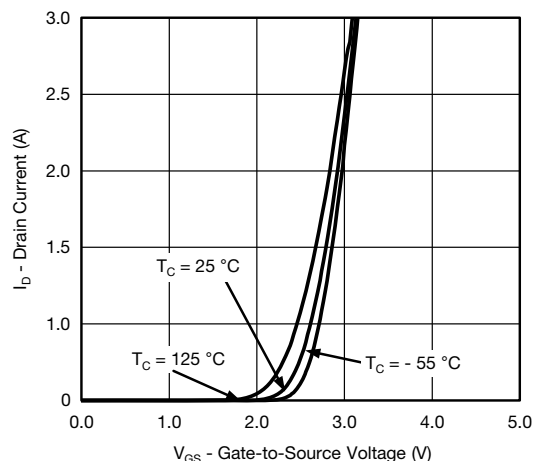
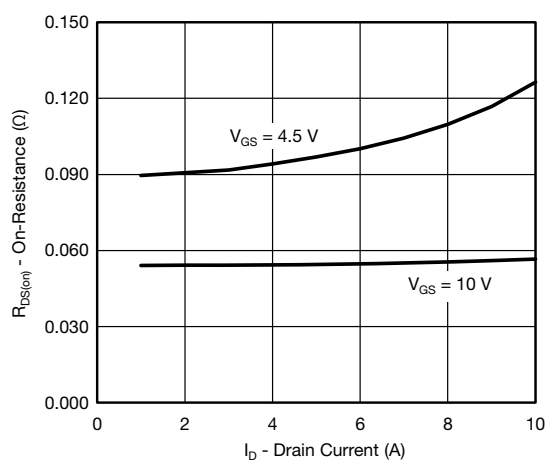
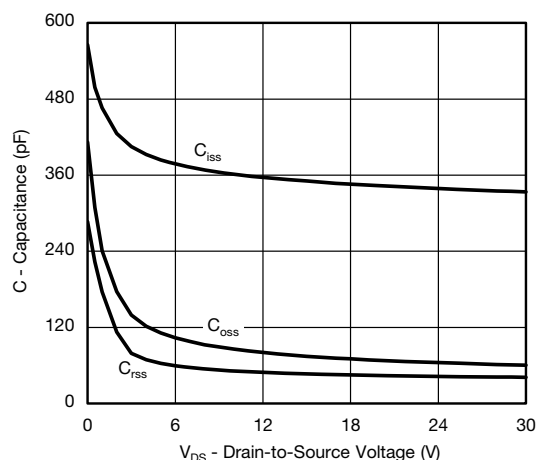
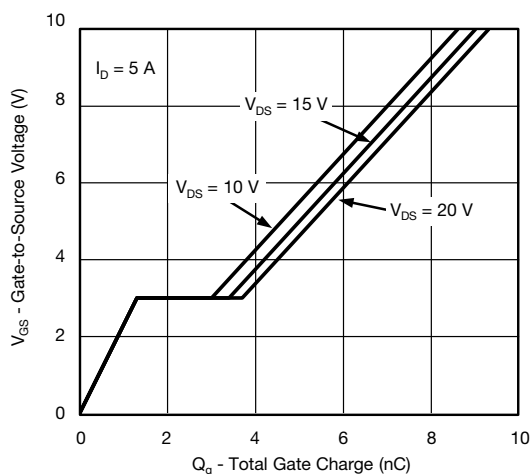
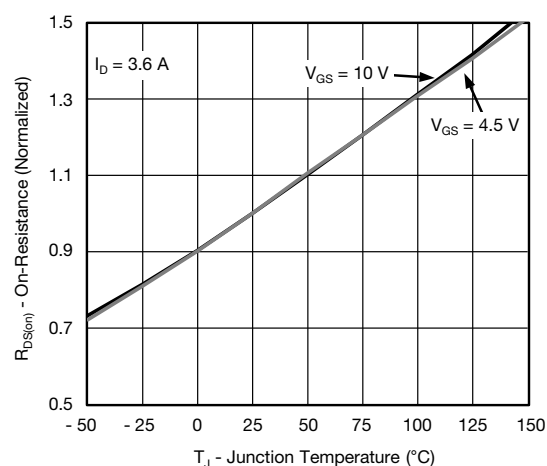
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

b. Guaranteed by design, not subject to production testing.

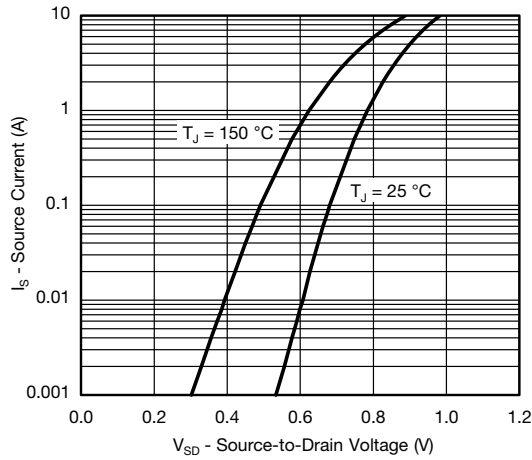


SCHOTTKY SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	$I_F = 1\text{ A}$		0.36	0.44	V
		$I_F = 1\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$		0.29	0.35	
Maximum Reverse Leakage Current	I_{rm}	$V_R = 30\text{ V}$		0.03	0.2	mA
		$V_R = 30\text{ V}, T_J = 75\text{ }^{\circ}\text{C}$		0.6	5	
		$V_R = 30\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$		7.5	60	
Junction Capacitance	C_T	$V_R = 15\text{ V}$		5.3		pF

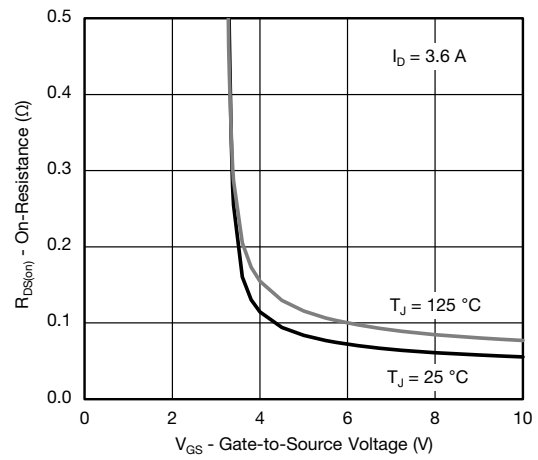
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

MOSFET TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current and Gate Voltage****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

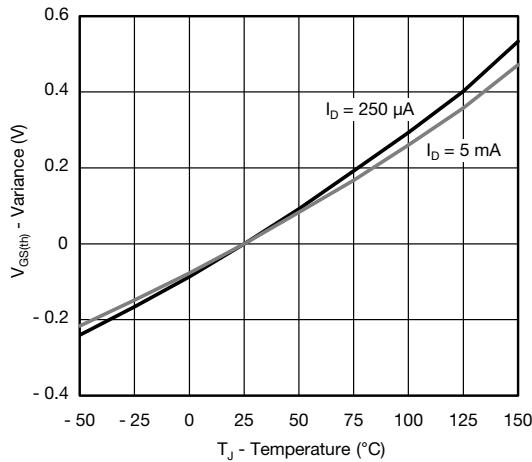
MOSFET TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



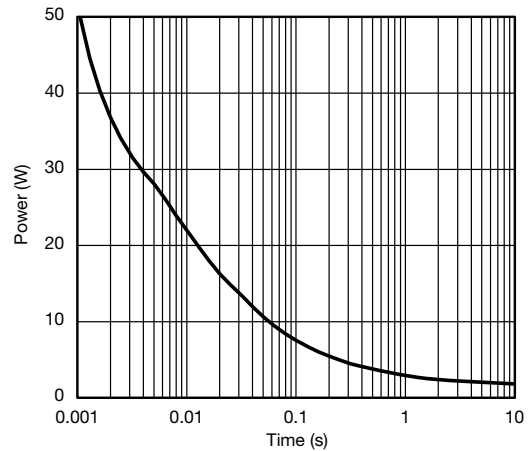
Source-Drain Diode Forward Voltage



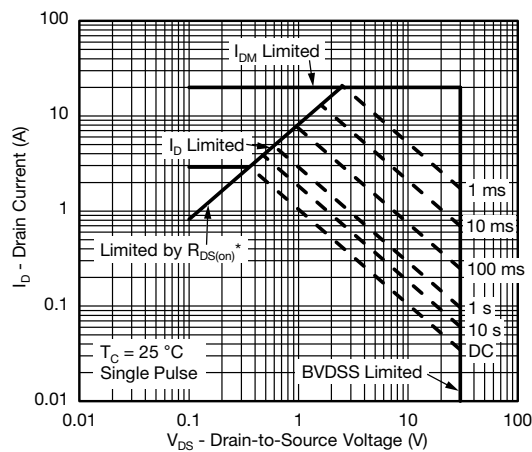
On-Resistance vs. Gate-to-Source Voltage



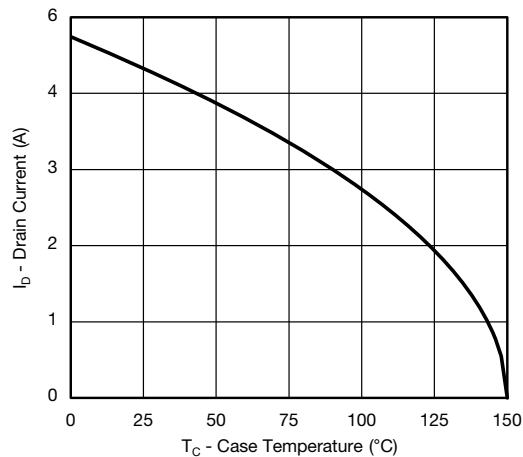
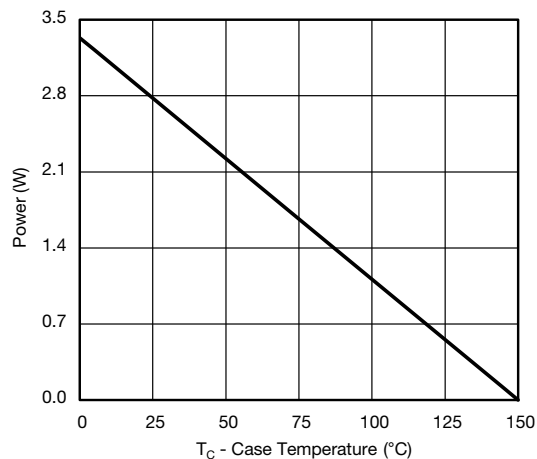
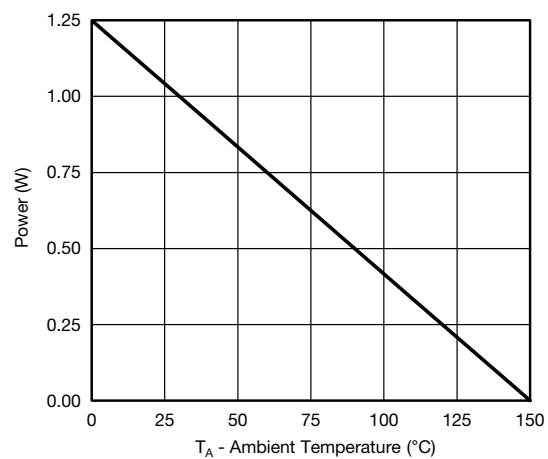
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

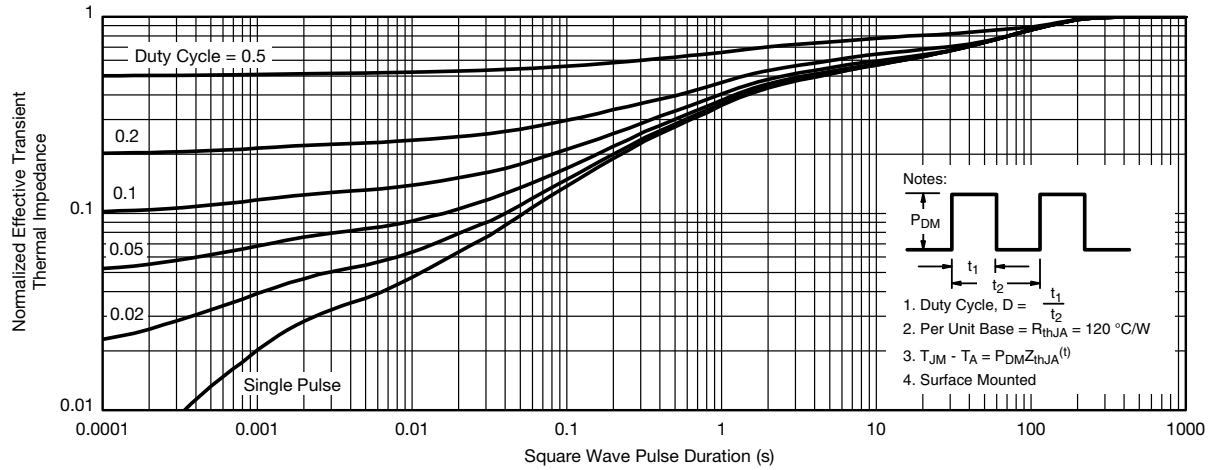


Safe Operating Area, Junction-to-Case

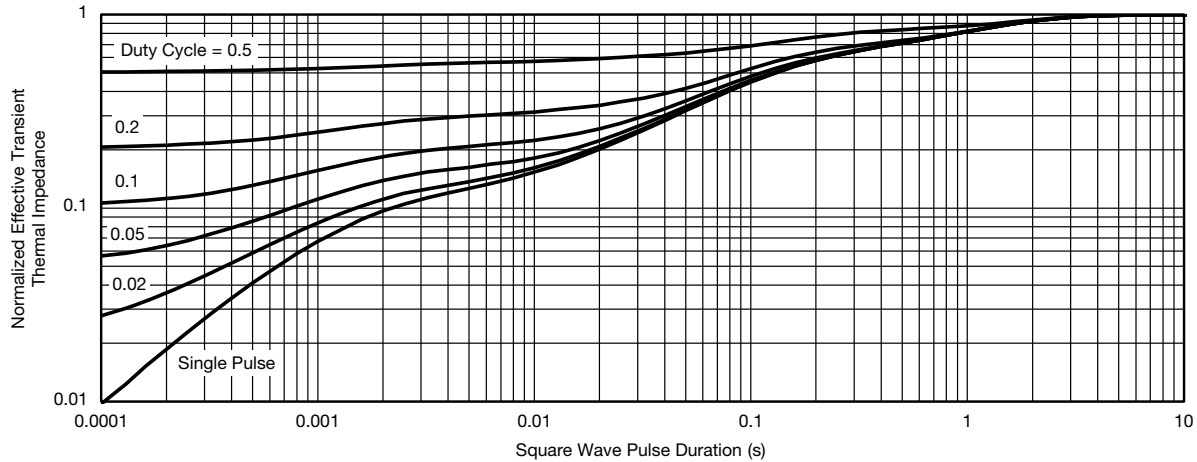
MOSFET TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**Current Derating*****Power Derating, Junction-to-Foot****Power Derating, Junction-to-Ambient**

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

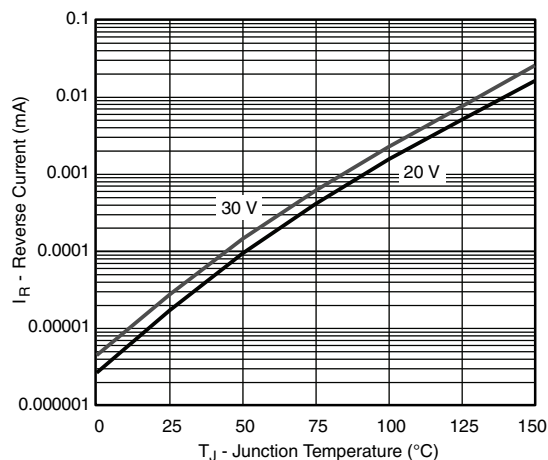
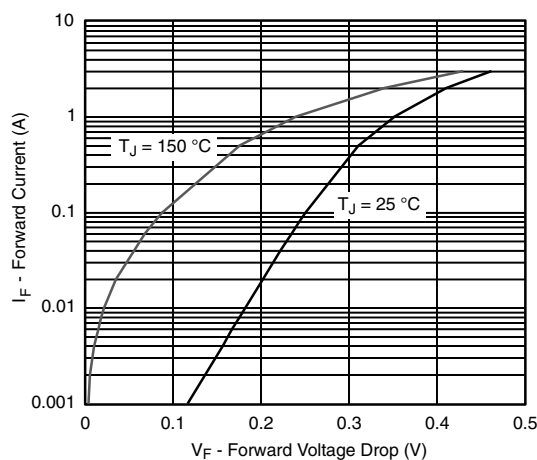
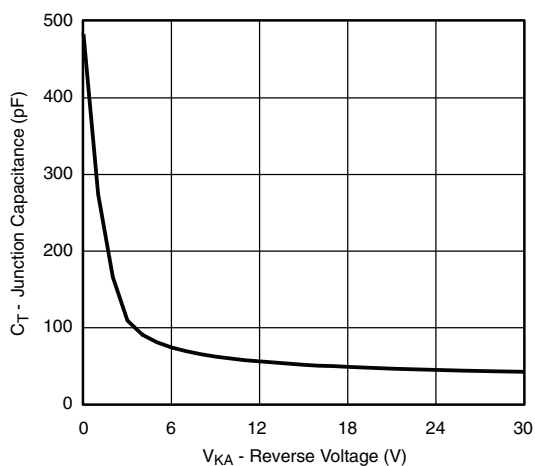
MOSFETS TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



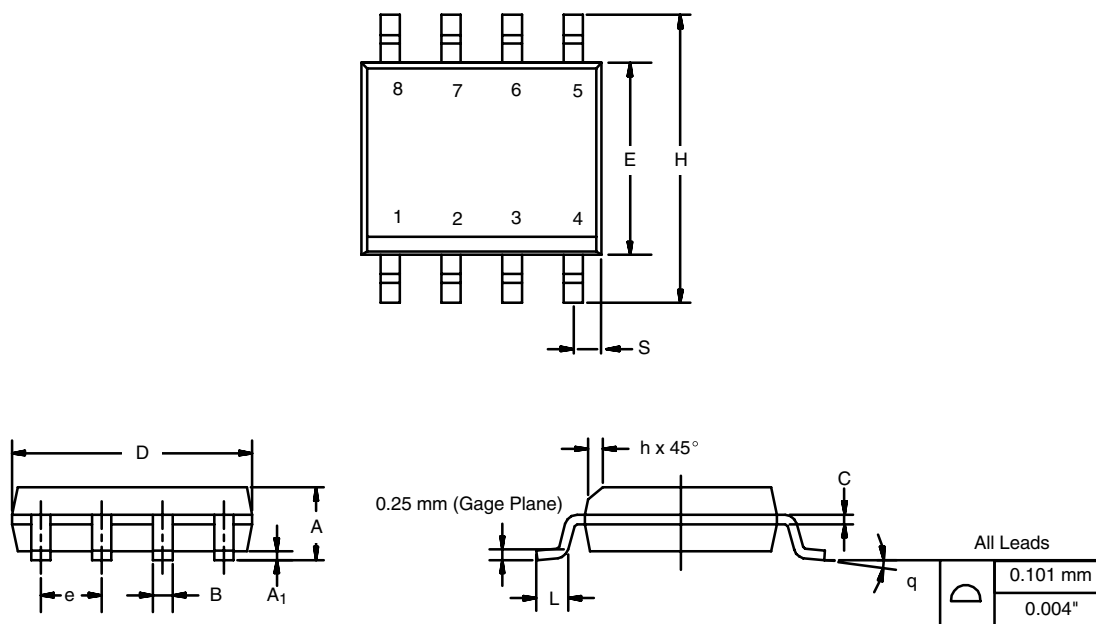
Normalized Thermal Transient Impedance, Junction-to-Foot

SCHOTTKY TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**Reverse Current vs. Junction Temperature****Forward Voltage Drop****Capacitance**

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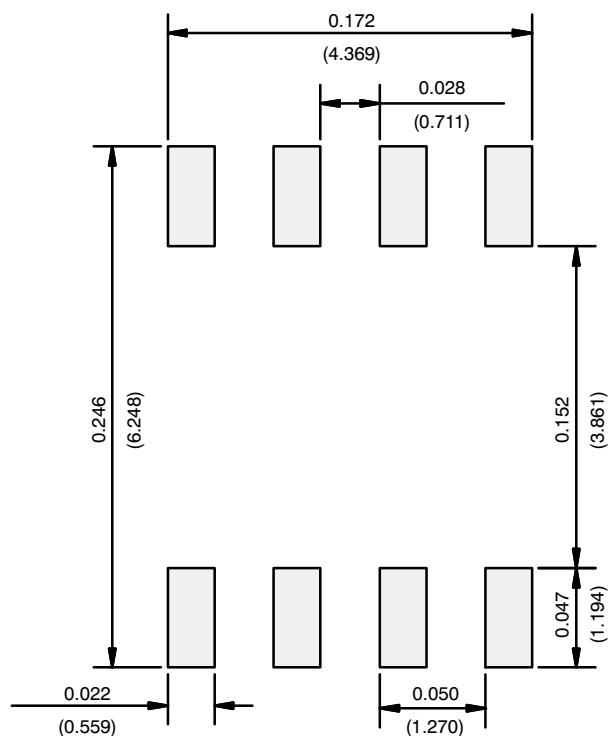
SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.20	0.004	0.008
B	0.35	0.51	0.014	0.020
C	0.19	0.25	0.0075	0.010
D	4.80	5.00	0.189	0.196
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.50	0.93	0.020	0.037
q	0°	8°	0°	8°
S	0.44	0.64	0.018	0.026
ECN: C-06527-Rev. I, 11-Sep-06				
DWG: 5498				

RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads
Dimensions in Inches/(mm)

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