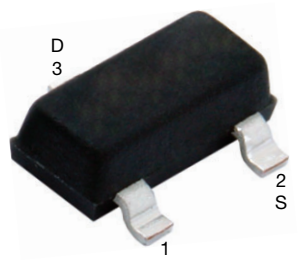
N-Channel 30 V (D-S) MOSFET

SOT-23 (TO-236)



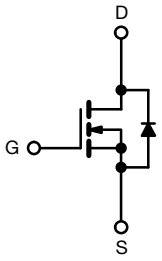
Top View

Marking code: L6

FEATURES

- TrenchFET® power MOSFET
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE Available



N-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	30
$R_{DS(on)}$ max. (Ω) at V_{GS} = 10 V	0.047
$R_{DS(on)}$ max. (Ω) at V_{GS} = 4.5 V	0.065
Q_g typ. (nC)	3.0
I_D (A)	4.0
Configuration	Single

ORDERING INFORMATION	
Package	SOT-23 (TO-236)
Lead (Pb)-free	Si2306BDS-T1-E3
Lead (Pb)-free and halogen-free	Si2306BDS-T1-GE3

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

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	30	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current (T_J = 150 °C) [a, b]	T_A = 25 °C	I_D	4.0 [c]	A
	T_A = 70 °C		3.5 [c]	
	T_A = 25 °C		3.16 [d]	
	T_A = 70 °C		2.7 [d]	
Pulsed drain current		I_{DM}	20	
Continuous source-drain diode current [a, b]		I_S	1.04 [c]	
			0.62 [d]	
Maximum power dissipation [a, b]	T_A = 25 °C	P_D	1.25 [c]	W
	T_A = 70 °C		0.8 [c]	
	T_A = 25 °C		0.75 [d]	
	T_A = 70 °C		0.48 [d]	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +150	°C

Notes

a. Surface mounted on 1" x 1" FR4 board, t ≤ 5 s
b. Pulse width limited by maximum junction temperature
c. t = 5 s
d. Steady state

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THERMAL RESISTANCE RATINGS					
PARAMETER		**SYMBOL**	**TYPICAL**	**MAXIMUM**	**UNIT**
Maximum junction-to-ambient [a]	t ≤ 5 s	R_{thJA}	60	100	°C/W
	Steady state		130	166	
Maximum junction-to-foot (drain)	Steady state	R_{thJF}	60	75	

Note

a. Surface mounted on 1" x 1" FR4 board

SPECIFICATIONS (T_A = 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 = 250 µA	30	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1.0	-	3.0	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	-	-	0.5	µA
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 55 °C	-	-	10	
On-state drain current [a]	$I_{D(on)}$	V_{DS} ≥ 4.5 V, V_{GS} = 10 V	6	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 3.5 A	-	0.038	0.047	Ω
		V_{GS} = 4.5 V, I_D = 2.8 A	-	0.052	0.065	
Forward transconductance [a]	g_{fs}	V_{DS} = 4.5 V, I_D = 2.5 A	-	7.0	-	S
Diode forward voltage	V_{SD}	V_{GS} = 0 V, I_S = 1.25 A	-	0.8	1.2	V
Dynamic						
Gate charge	Q_g	V_{DS} = 15 V, V_{GS} = 5 V, I_D = 2.5 A	-	3.0	4.5	nC
Total gate charge	Q_{gt}	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 2.5 A	-	6	9	
Gate-source charge	Q_{gs}		-	1.6	-	
Gate-drain charge	Q_{gd}		-	0.6	-	
Gate resistance	R_g	f = 1 MHz	2.0	5.0	7.5	Ω
Input capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz	-	305	-	pF
Output capacitance	C_{oss}		-	65	-	
Reverse transfer capacitance	C_{rss}		-	29	-	
Switching						
Turn-on delay time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 15 Ω, I_D ≅ 1 A, V_{GEN} = 0 V, R_g = 6 Ω	-	7	11	ns
Rise time	t_r		-	12	18	
Turn-off delay time	$t_{d(off)}$		-	14	25	
Fall time	t_f		-	6	10	
Reverse recovery time	t_{rr}	I_F = 1.25 A, di/dt = 100 A/µs	-	14	21	
Body diode reverse recovery charge	Q_{rr}		-	6	10	nC

Notes

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %

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.

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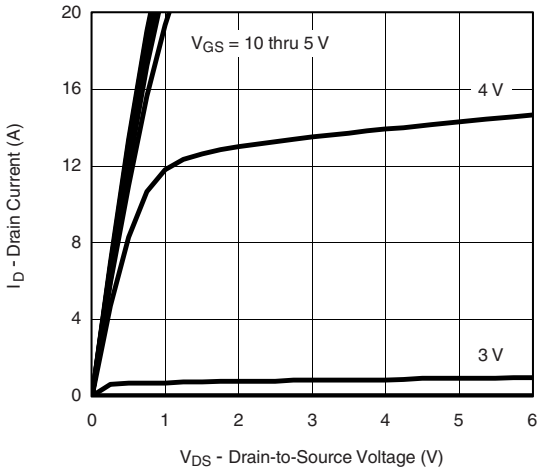
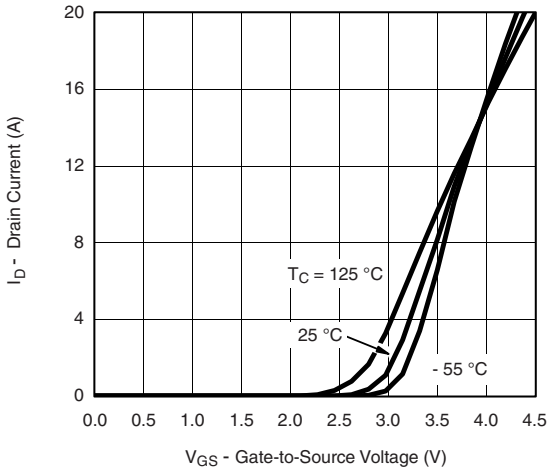
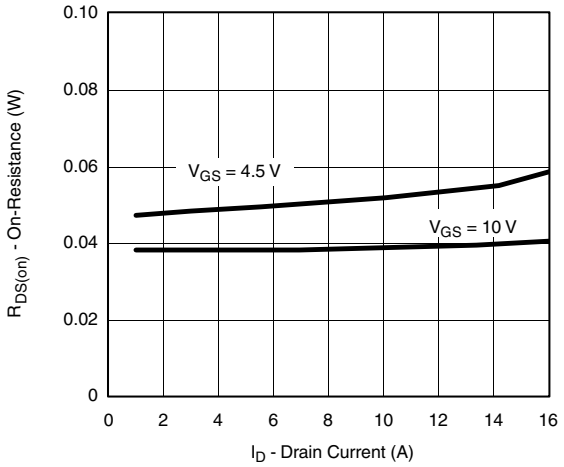
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



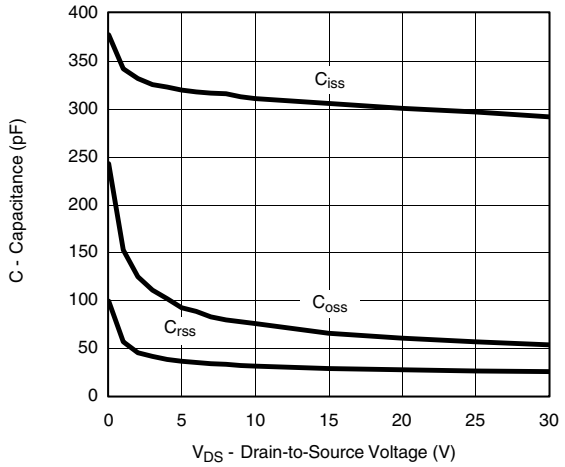
Output Characteristics



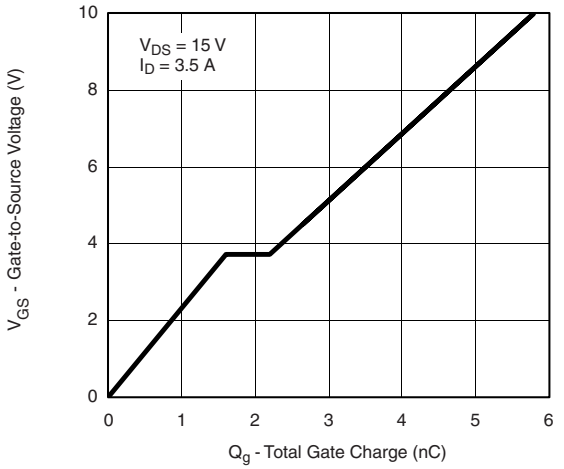
Transfer Characteristics



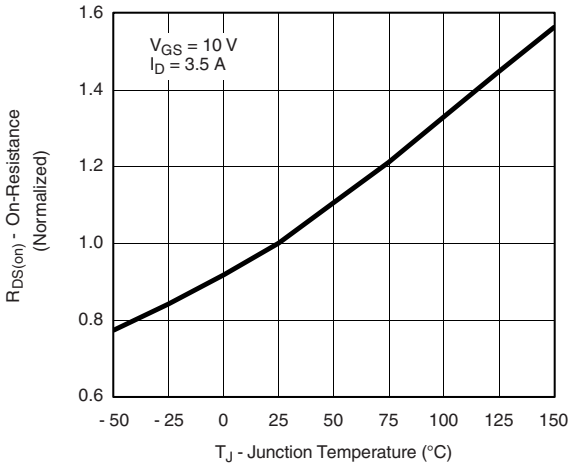
On-Resistance vs. Drain Current



Capacitance



Gate Charge



On-Resistance vs. Junction Temperature

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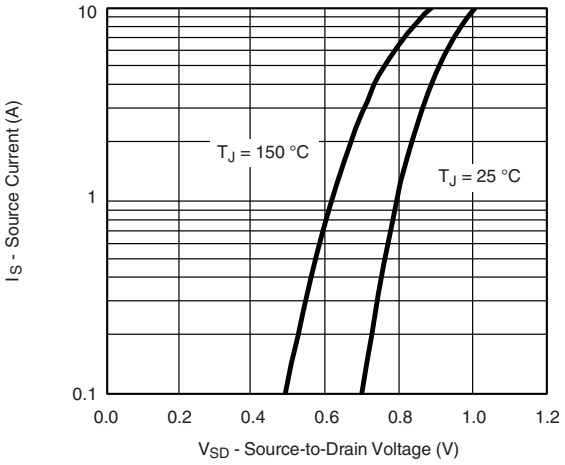
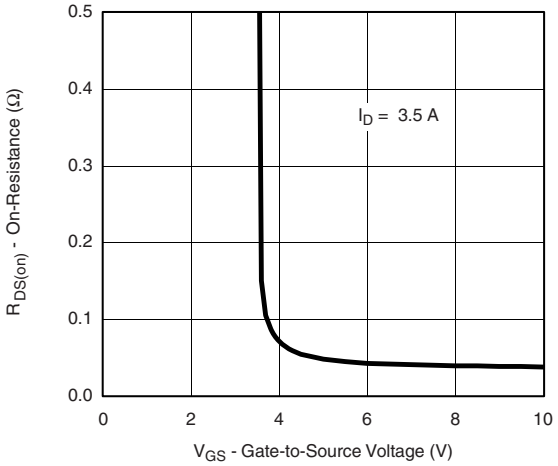
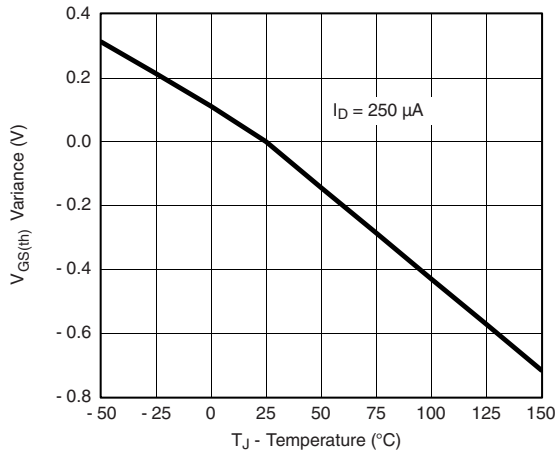


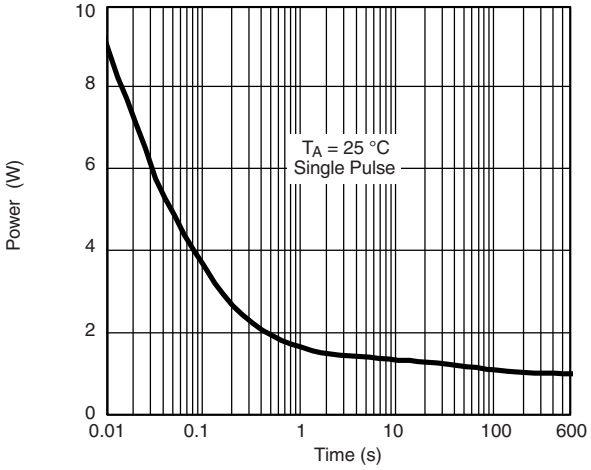
Source-Drain Diode Forward Voltage



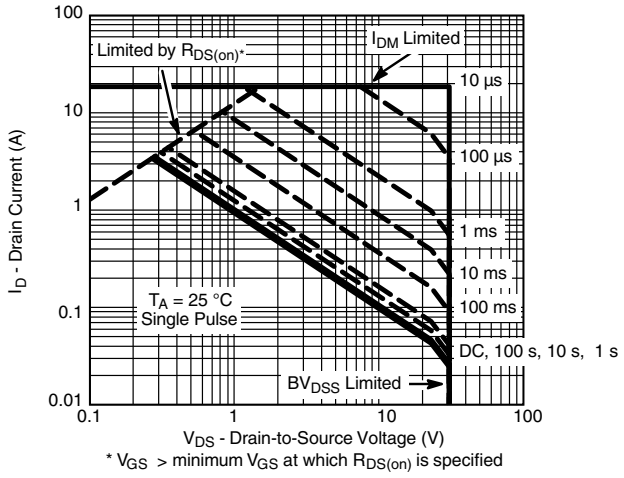
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power



Safe Operating Area

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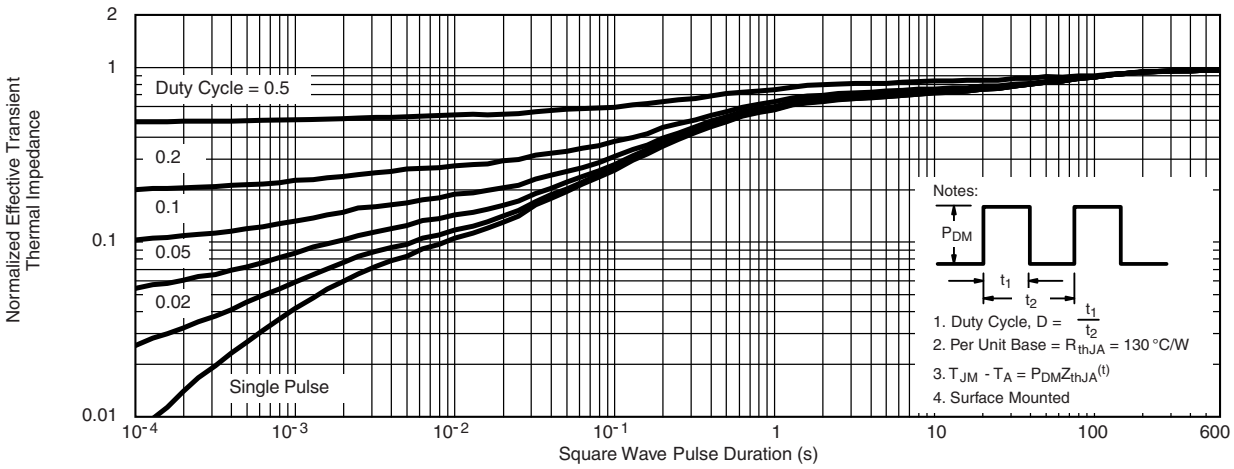

Normalized Thermal Transient Impedance, Junction-to-Ambient

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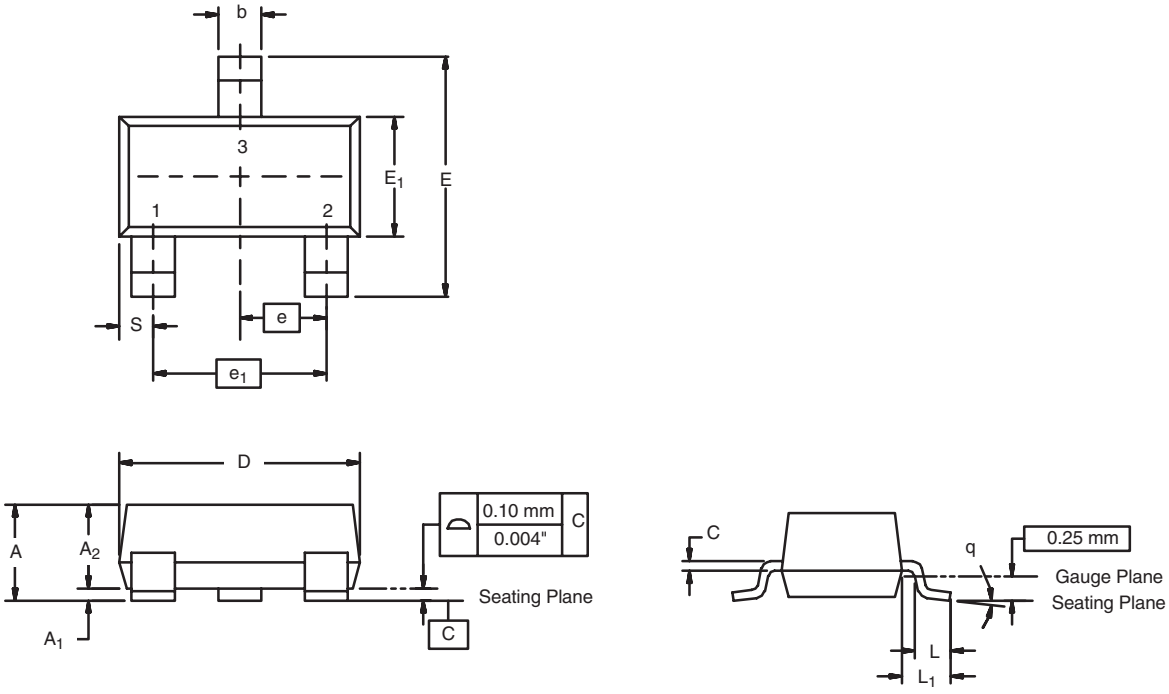
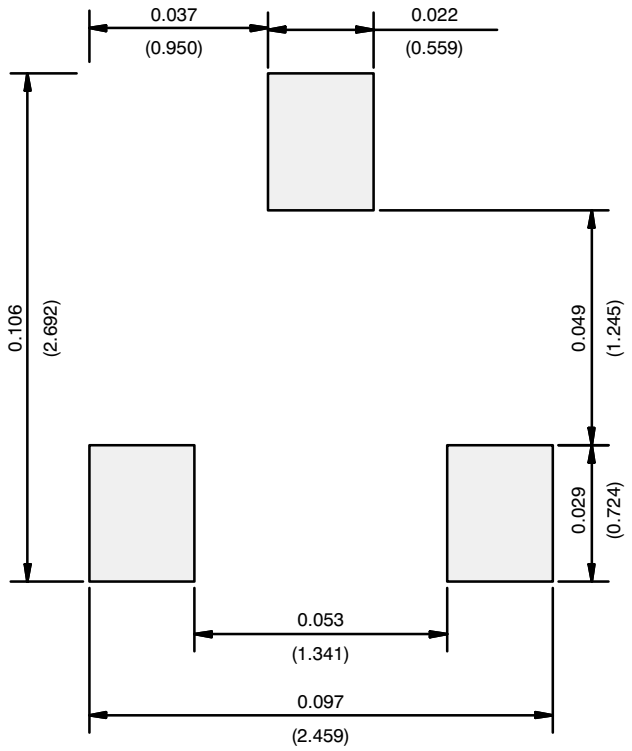
SOT-23 (TO-236): 3-LEAD



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A_1	0.01	0.10	0.0004	0.004
A_2	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E_1	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e_1	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L_1	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°
ECN: S-03946-Rev. K, 09-Jul-01 DWG: 5479				

RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads
Dimensions in Inches/(mm)

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APPLICATION NOTE

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