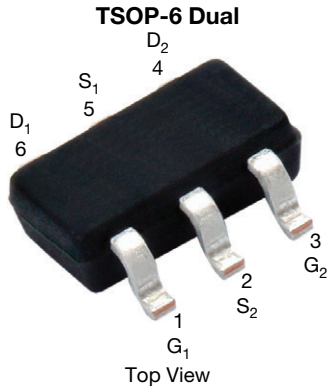


Automotive Dual P-Channel 30 V (D-S) 175 °C MOSFET



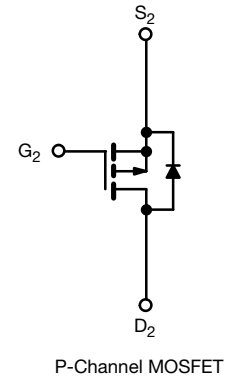
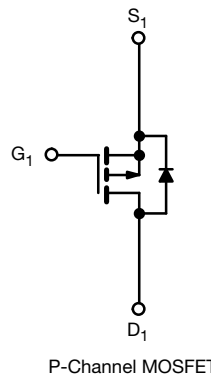
Marking code: 8X

PRODUCT SUMMARY	
V_{DS} (V)	-30
$R_{DS(on)}$ (Ω) at $V_{GS} = -10$ V	-0.110
$R_{DS(on)}$ (Ω) at $V_{GS} = -4.5$ V	-0.185
I_D (A)	-2.75
Configuration	Dual
Package	TSOP-6

FEATURES

- TrenchFET® power MOSFET
- AEC-Q101 qualified
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE


RoHS
 COMPLIANT
 HALOGEN
FREE


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	$T_C = 25$ °C	I_D	-3	A
	$T_C = 125$ °C		-1.74	
Pulsed drain current		I_{DM}	-11	
Continuous source current (diode conduction) ^a		I_S	-2.1	
Maximum power dissipation ^a	$T_C = 25$ °C	P_D	1.67	W
	$T_C = 125$ °C		0.56	
Unclamped inductive surge UIS		I_{AV}	-5	A
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Maximum junction-to-ambient ^a	Steady state	R_{thJA}	150	°C/W
Maximum junction-to-foot (drain)	Steady state	R_{thJF}	90	

Note

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



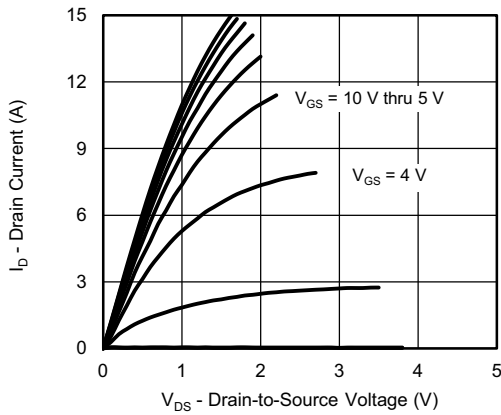
SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250 \mu\text{A}$		-1.5	-	-2.5	V
Gate-body leakage	I_{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$		-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	$V_{GS} = 0 \text{ V}$	$V_{DS} = -30 \text{ V}$	-	-	-1	μA
		$V_{GS} = 0 \text{ V}$	$V_{DS} = -30 \text{ V}, T_J = 175^\circ\text{C}$	-	-	-50	
On-state drain current ^a	$I_{D(on)}$	$V_{GS} = -10 \text{ V}$	$V_{DS} \leq -5 \text{ V}$	-4	-	-	A
Drain-source on-state resistance ^a	$R_{DS(on)}$	$V_{GS} = -10 \text{ V}$	$I_D = -1.5 \text{ A}$	-	0.085	0.133	Ω
		$V_{GS} = -4.5 \text{ V}$	$I_D = -2 \text{ A}$	-	0.135	0.185	
Forward transconductance ^a	g_{fs}	$V_{DS} = -5 \text{ V}, I_D = -1 \text{ A}$		-	4.2	-	S
Diode forward voltage ^a	V_{SD}	$I_S = -0.5 \text{ A}, V_{GS} = 0 \text{ V}$		-	-0.83	-1.10	V
Dynamic ^b							
Input capacitance	C_{iss}	$V_{GS} = 0 \text{ V}$	$V_{DS} = -15 \text{ V}$	-	456	570	μF
Output capacitance	C_{oss}			-	85	106	
Reverse capacitance	C_{riss}			-	59	74	
Total gate charge	Q_g	$V_{GS} = -10 \text{ V}$	$V_{DS} = -15 \text{ V}, I_D = -3 \text{ A}$	-	9.7	12.2	nC
Gate-source charge	Q_{gs}			-	1.3	-	
Gate-drain charge	Q_{gd}			-	2	-	
Gate resistance	R_g	f = 1 MHz		9	-	24	Ω
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -10 \text{ V}, R_L = 10 \Omega,$ $I_D \cong -1 \text{ A}, V_{GEN} = -10 \text{ V}, R_g = 1 \Omega$		-	6.6	8.3	ns
Rise time	t_r			-	2.4	3	
Turn-off delay time	$t_{d(off)}$			-	18.4	23	
Fall time	t_f			-	2.2	2.8	
Source-Drain Diode Ratings and Characteristic ^b							
Pulsed current	I_{SM}			-	-	-11	A
Forward voltage	V_{SD}	$I_F = 0.5 \text{ A}, V_{GS} = 0 \text{ V}$		-	-0.83	-1.1	V
Reverse recovery fall time	t_a	$V_{DD} = -24 \text{ V}, I_{FM} = -1.5 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s},$ $R = 160 \Omega, L = 1 \text{ mH}, \text{pulse } W = 2 \mu\text{s}$		-	9.1	-	ns
Reverse recovery rise time	t_b			-	4.8	-	ns
Body diode reverse recovery time	t_{rr}			-	14	28	ns
Body diode reverse recovery charge	Q_{rr}			-	9	18	μC
Body diode peak reverse recovery current	$I_{RM(REC)}$			-	-1.4	-	A

Notes

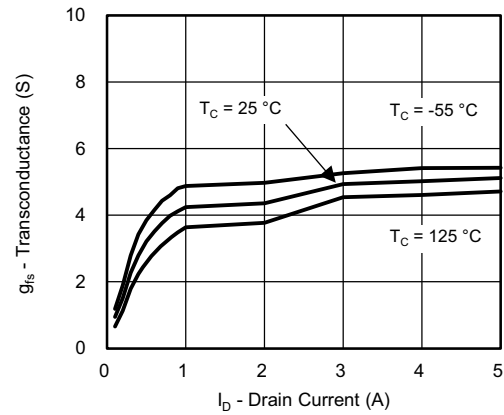
- a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$
b. Guaranteed by design, not subject to production testing

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.

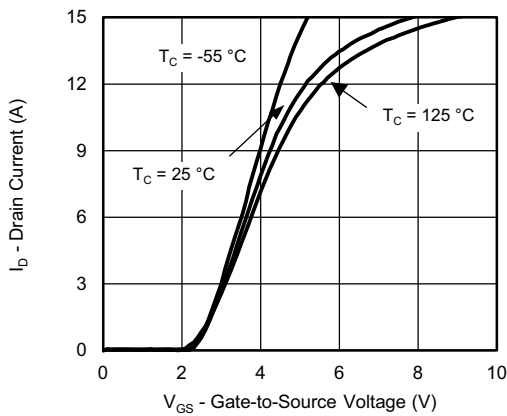
TYPICAL CHARACTERISTICS (25 °C unless otherwise noted)



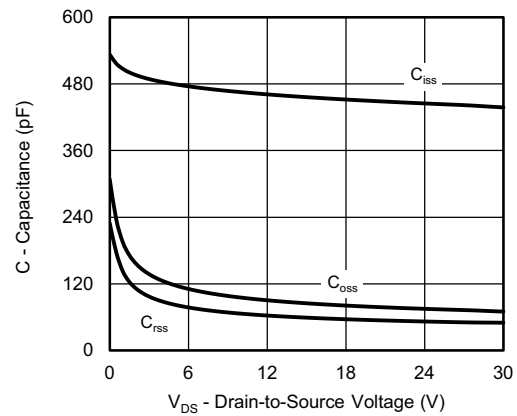
Output Characteristics



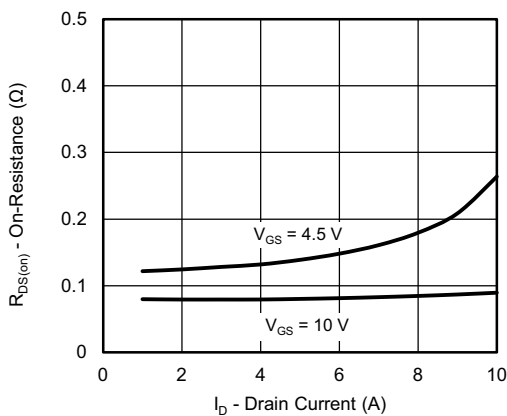
Transconductance



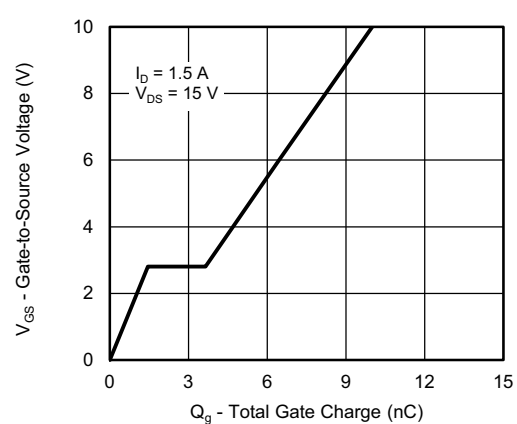
Transfer Characteristics



Capacitance

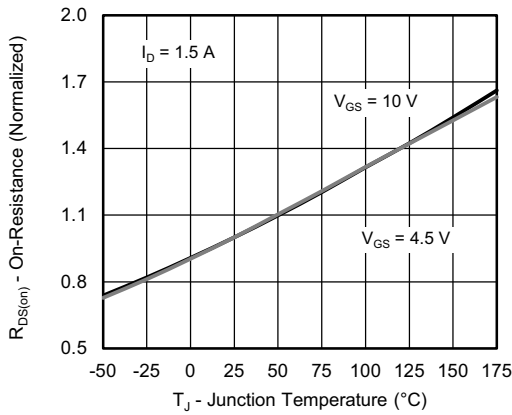


On-Resistance vs. Drain Current

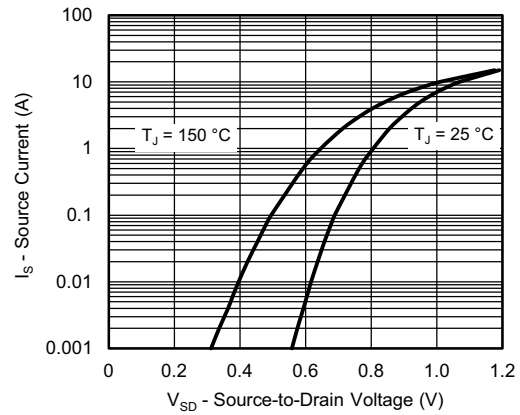


Gate Charge

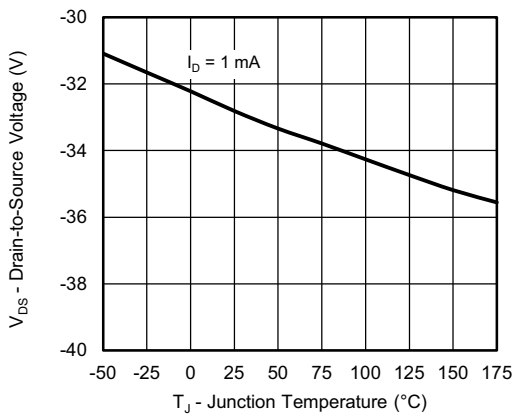
TYPICAL CHARACTERISTICS (25 °C unless otherwise noted)



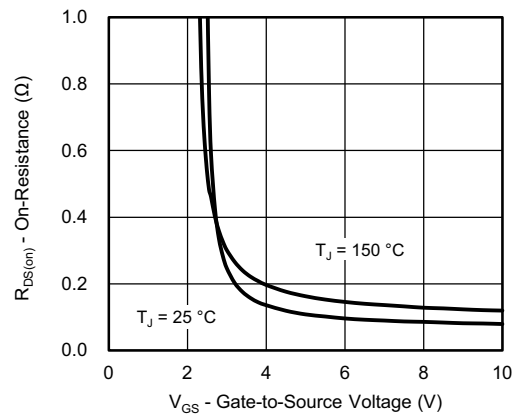
On-Resistance vs. Junction Temperature



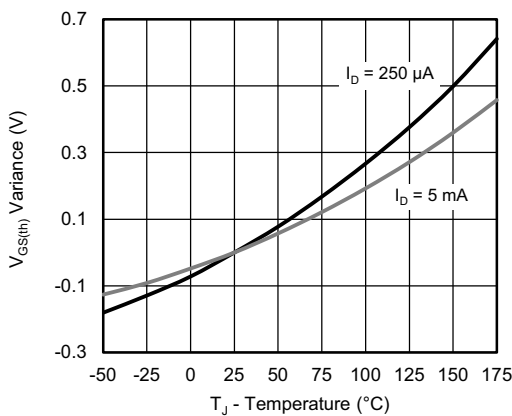
Source-Drain Diode Forward Voltage



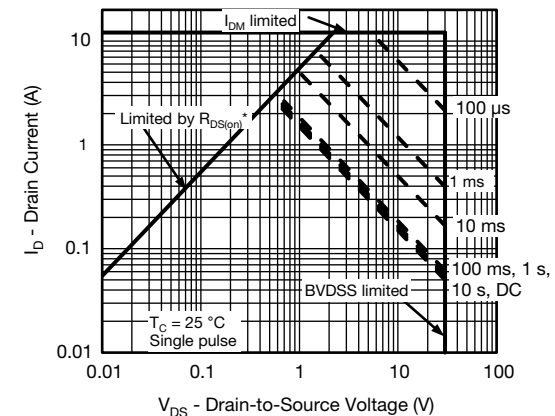
Drain Source Breakdown vs. Junction Temperature



On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

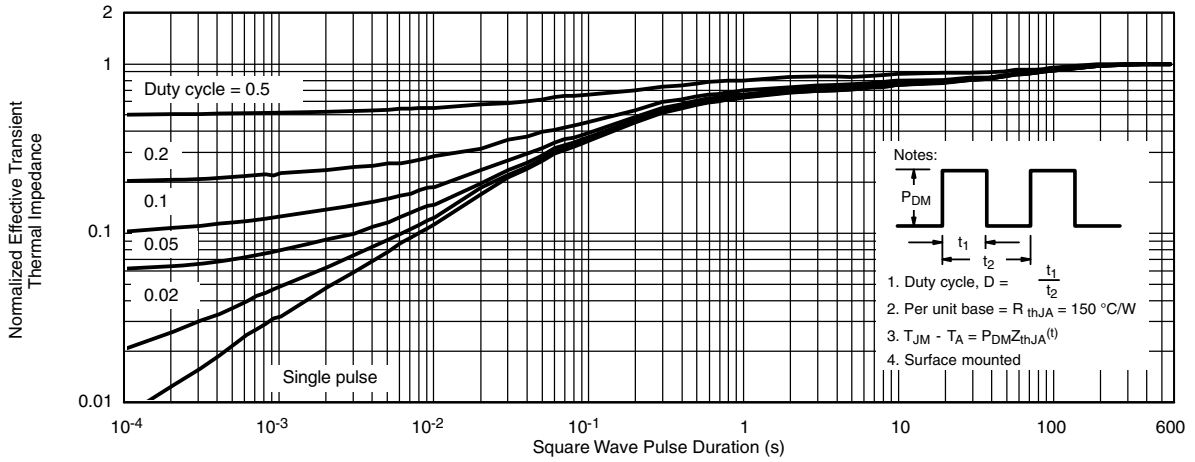


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

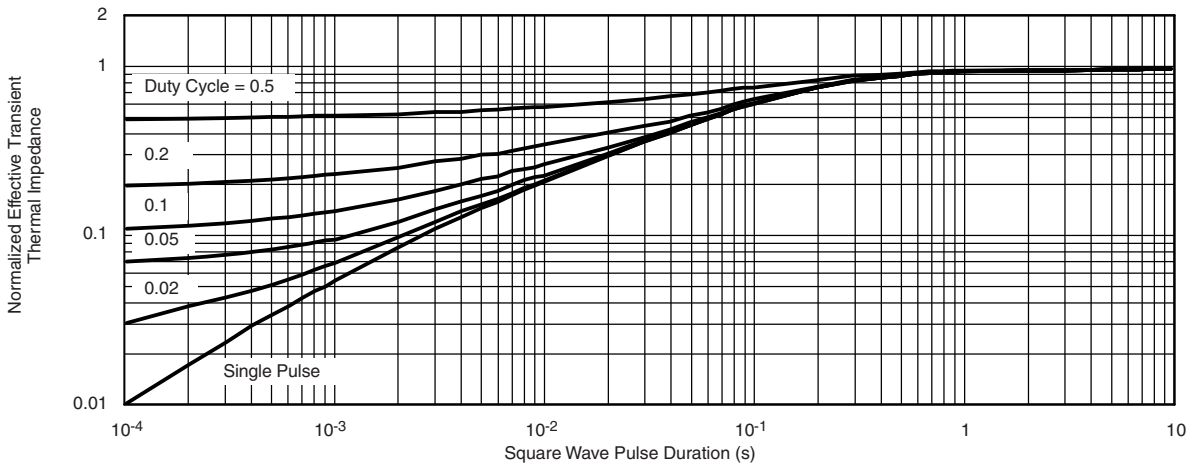
Safe Operating Area, Junction-to-Case



TYPICAL CHARACTERISTICS (25 °C unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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TSOP: 5/6-LEAD

JEDEC Part Number: MO-193C



5-LEAD TSOP

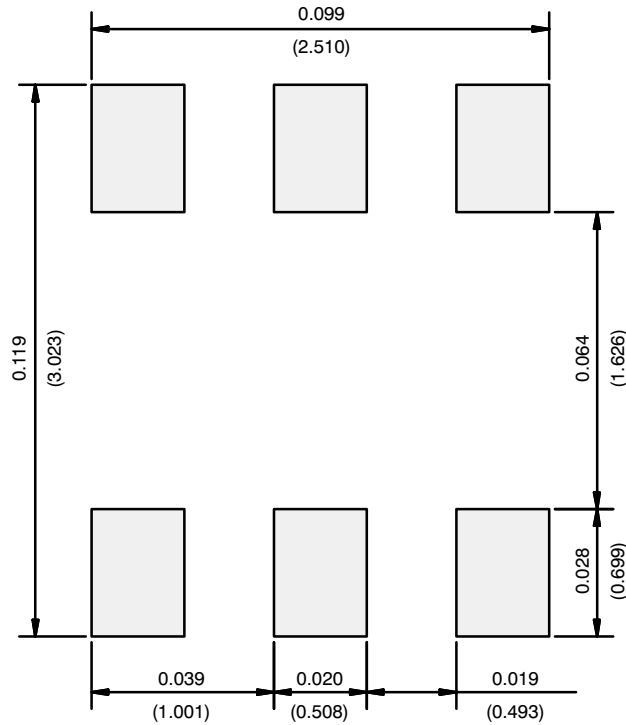


6-LEAD TSOP



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.91	-	1.10	0.036	-	0.043
A ₁	0.01	-	0.10	0.0004	-	0.004
A ₂	0.90	-	1.00	0.035	0.038	0.039
b	0.30	0.32	0.45	0.012	0.013	0.018
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.95	3.05	3.10	0.116	0.120	0.122
E	2.70	2.85	2.98	0.106	0.112	0.117
E ₁	1.55	1.65	1.70	0.061	0.065	0.067
e	0.95 BSC			0.0374 BSC		
e ₁	1.80	1.90	2.00	0.071	0.075	0.079
L	0.32	-	0.50	0.012	-	0.020
L ₁	0.60 Ref			0.024 Ref		
L ₂	0.25 BSC			0.010 BSC		
R	0.10	-	-	0.004	-	-
θ	0°	4°	8°	0°	4°	8°
θ ₁	7° Nom			7° Nom		
ECN: C-06593-Rev. I, 18-Dec-06						
DWG: 5540						

RECOMMENDED MINIMUM PADS FOR TSOP-6



Recommended Minimum Pads
Dimensions in Inches/(mm)

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