

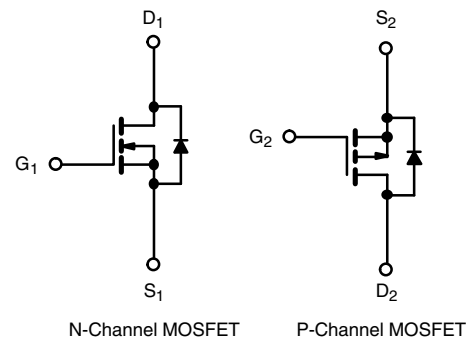
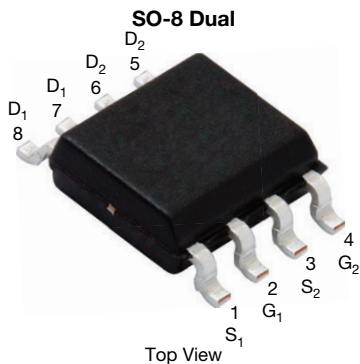
Automotive N- and P-Channel 30 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY		
	N-CHANNEL	P-CHANNEL
V_{DS} (V)	30	-30
$R_{DS(on)}$ (Ω) at $V_{GS} = \pm 10$ V	0.031	0.070
$R_{DS(on)}$ (Ω) at $V_{GS} = \pm 4.5$ V	0.042	0.190
I_D (A)	7.3	-5.3
Configuration	N- and P-Pair	
Package	SO-8	

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

Marking Code: Q4532A

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)					
PARAMETER	SYMBOL	N-CHANNEL	P-CHANNEL	UNIT	
Drain-Source Voltage	V_{DS}	30	-30	V	
Gate-Source Voltage	V_{GS}	± 20			
Continuous Drain Current	I_D	$T_C = 25$ °C	7.3	-5.3	A
		$T_C = 125$ °C	4.2	-3	
Continuous Source Current (Diode Conduction)	I_S	4.2	-3		
Pulsed Drain Current ^a	I_{DM}	29	-21		
Single Pulse Avalanche Current	I_{AS}	L = 0.1 mH	10	-9	mJ
Single Pulse Avalanche Energy			E_{AS}	5	
Maximum Power Dissipation ^a	P_D	$T_C = 25$ °C	3.3	3.3	W
		$T_C = 125$ °C	1.1	1.1	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175		°C	

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	N-CHANNEL	P-CHANNEL	UNIT
Junction-to-Ambient	R_{thJA}	110	105	°C/W
Junction-to-Foot (Drain)				

Notes

- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).
- Parametric verification ongoing.



SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)									
PARAMETER	SYMBOL	TEST CONDITIONS			MIN.	TYP.	MAX.	UNIT	
Static									
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0, I_D = 250\text{ }\mu\text{A}$		N-Ch	30	-	-	V	
		$V_{GS} = 0, I_D = -250\text{ }\mu\text{A}$		P-Ch	-30	-	-		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		N-Ch	1.5	2	2.5		
		$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$		P-Ch	-1.5	-2	-2.5		
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$		N-Ch	-	-	± 100	nA	
				P-Ch	-	-	± 100		
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 30\text{ V}$	N-Ch	-	-	1	μA	
		$V_{GS} = 0\text{ V}$	$V_{DS} = -30\text{ V}$	P-Ch	-	-	-1		
		$V_{GS} = 0\text{ V}$	$V_{DS} = 30\text{ V}, T_J = 125\text{ }^\circ\text{C}$	N-Ch	-	-	50		
		$V_{GS} = 0\text{ V}$	$V_{DS} = -30\text{ V}, T_J = 125\text{ }^\circ\text{C}$	P-Ch	-	-	-50		
		$V_{GS} = 0\text{ V}$	$V_{DS} = 30\text{ V}, T_J = 175\text{ }^\circ\text{C}$	N-Ch	-	-	150		
		$V_{GS} = 0\text{ V}$	$V_{DS} = -30\text{ V}, T_J = 175\text{ }^\circ\text{C}$	P-Ch	-	-	-150		
On-State Drain Current ^a	$I_{D(on)}$	$V_{GS} = 10\text{ V}$	$V_{DS} = 5\text{ V}$	N-Ch	15	-	-	A	
		$V_{GS} = -10\text{ V}$	$V_{DS} = -5\text{ V}$	P-Ch	-15	-	-		
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 4.9\text{ A}$	N-Ch	-	0.021	0.031	Ω	
		$V_{GS} = -10\text{ V}$	$I_D = -3.5\text{ A}$	P-Ch	-	0.056	0.070		
		$V_{GS} = 10\text{ V}$	$I_D = 4.9\text{ A}, T_J = 125\text{ }^\circ\text{C}$	N-Ch	-	-	0.064		
		$V_{GS} = -10\text{ V}$	$I_D = -3.5\text{ A}, T_J = 125\text{ }^\circ\text{C}$	P-Ch	-	-	0.100		
		$V_{GS} = 10\text{ V}$	$I_D = 4.9\text{ A}, T_J = 175\text{ }^\circ\text{C}$	N-Ch	-	-	0.082		
		$V_{GS} = -10\text{ V}$	$I_D = -3.5\text{ A}, T_J = 175\text{ }^\circ\text{C}$	P-Ch	-	-	0.117		
		$V_{GS} = 4.5\text{ V}$	$I_D = 4.1\text{ A}$	N-Ch	-	0.033	0.042		
		$V_{GS} = -4.5\text{ V}$	$I_D = -2.5\text{ A}$	P-Ch	-	0.157	0.190		
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 4.9\text{ A}$		N-Ch	-	22	-	S	
		$V_{DS} = -15\text{ V}, I_D = -3.5\text{ A}$		P-Ch	-	5.5	-		
Dynamic ^b									
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 15\text{ V}, f = 1\text{ MHz}$	N-Ch	-	357	535	pF	
		$V_{GS} = 0\text{ V}$	$V_{DS} = -15\text{ V}, f = 1\text{ MHz}$	P-Ch	-	352	528		
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 15\text{ V}, f = 1\text{ MHz}$	N-Ch	-	82	123		
		$V_{GS} = 0\text{ V}$	$V_{DS} = -15\text{ V}, f = 1\text{ MHz}$	P-Ch	-	95	142		
Reverse Transfer Capacitance	C_{rss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 15\text{ V}, f = 1\text{ MHz}$	N-Ch	-	36	53		
		$V_{GS} = 0\text{ V}$	$V_{DS} = -15\text{ V}, f = 1\text{ MHz}$	P-Ch	-	59	88		
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$	$V_{DS} = 15\text{ V}, I_D = 3.9\text{ A}$	N-Ch	-	5.9	7.8	nC	
		$V_{GS} = -10\text{ V}$	$V_{DS} = -15\text{ V}, I_D = -2.5\text{ A}$	P-Ch	-	7.9	10.2		
Gate-Source Charge	Q_{gs}	$V_{GS} = 10\text{ V}$	$V_{DS} = 15\text{ V}, I_D = 3.9\text{ A}$	N-Ch	-	1	-		
		$V_{GS} = -10\text{ V}$	$V_{DS} = -15\text{ V}, I_D = -2.5\text{ A}$	P-Ch	-	1.1	-		
Gate-Drain Charge ^c	Q_{gd}	$V_{GS} = 10\text{ V}$	$V_{DS} = 15\text{ V}, I_D = 3.9\text{ A}$	N-Ch	-	1.9	-		
		$V_{GS} = -10\text{ V}$	$V_{DS} = -15\text{ V}, I_D = -2.5\text{ A}$	P-Ch	-	2.7	-		
Gate Resistance	R_g	$f = 1\text{ MHz}$			N-Ch	1.7	3.4	5.1	Ω
					P-Ch	2.8	5.8	8.6	



SPECIFICATIONS (T _C = 25 °C, unless otherwise noted)								
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 15 Ω I _D ≡ 1 A, V _{GEN} = 10 V, R _g = 1 Ω	N-Ch	-	7	10	ns	
		V _{DD} = -15 V, R _L = 15 Ω I _D ≡ -1 A, V _{GEN} = -10 V, R _g = 1 Ω	P-Ch	-	6	9		
Rise Time	t _r	V _{DD} = 15 V, R _L = 15 Ω I _D ≡ 1 A, V _{GEN} = 10 V, R _g = 1 Ω	N-Ch	-	17	21		
		V _{DD} = -15 V, R _L = 15 Ω I _D ≡ -1 A, V _{GEN} = -10 V, R _g = 1 Ω	P-Ch	-	17	21		
Turn-Off Delay Time	t _{d(off)}	V _{DD} = 15 V, R _L = 15 Ω I _D ≡ 1 A, V _{GEN} = 10 V, R _g = 1 Ω	N-Ch	-	10	14		
		V _{DD} = -15 V, R _L = 15 Ω I _D ≡ -1 A, V _{GEN} = -10 V, R _g = 1 Ω	P-Ch	-	19	24		
Fall Time	t _f	V _{DD} = 15 V, R _L = 15 Ω I _D ≡ 1 A, V _{GEN} = 10 V, R _g = 1 Ω	N-Ch	-	19	24		
		V _{DD} = -15 V, R _L = 15 Ω I _D ≡ -1 A, V _{GEN} = -10 V, R _g = 1 Ω	P-Ch	-	16	20		
Source-Drain Diode Ratings and Characteristics ^b								
Pulsed Current ^a	I _{SM}		N-Ch	-	-	29		A
			P-Ch	-	-	-21		
Forward Voltage	V _{SD}	I _S = 2 A	N-Ch	-	0.8	1.2	V	
		I _S = -1.5 A	P-Ch	-	-0.8	-1.2		

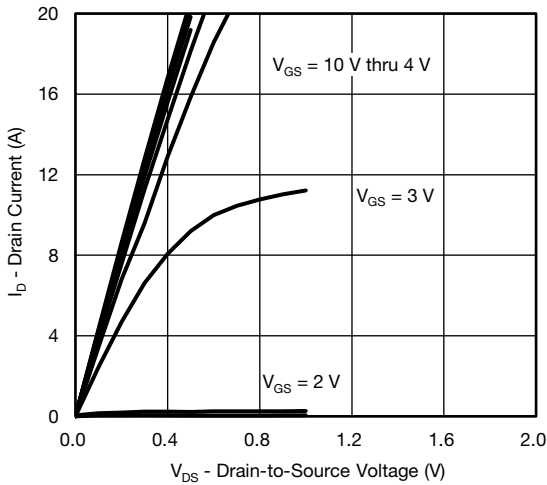
Notes

- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

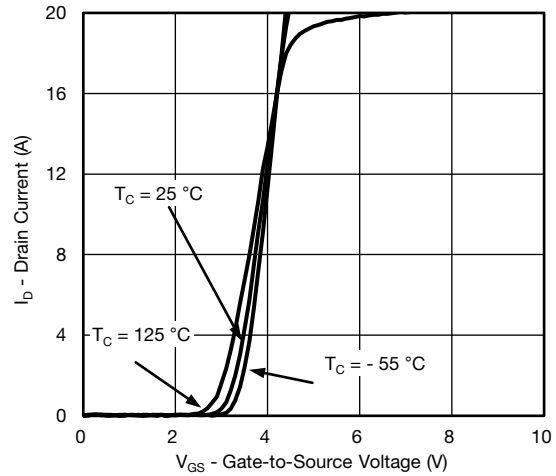
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



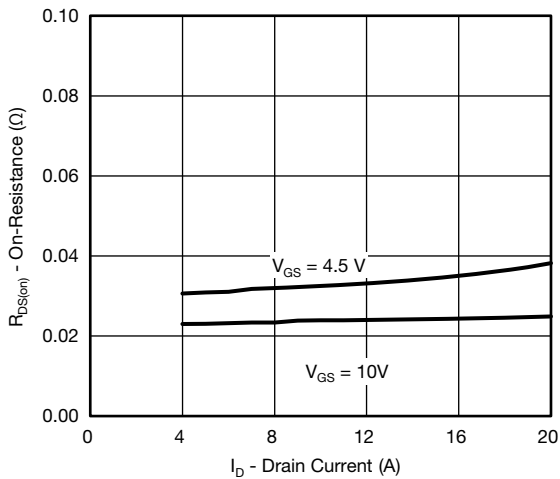
N-CHANNEL TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



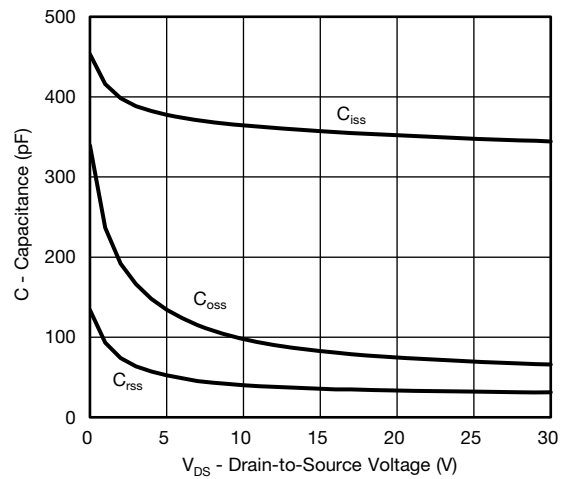
Output Characteristics



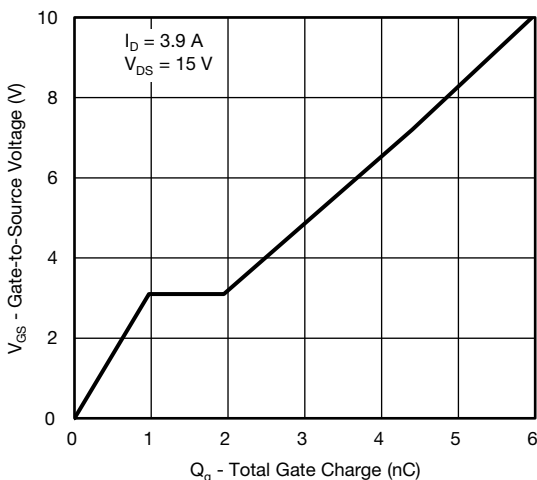
Transfer Characteristics



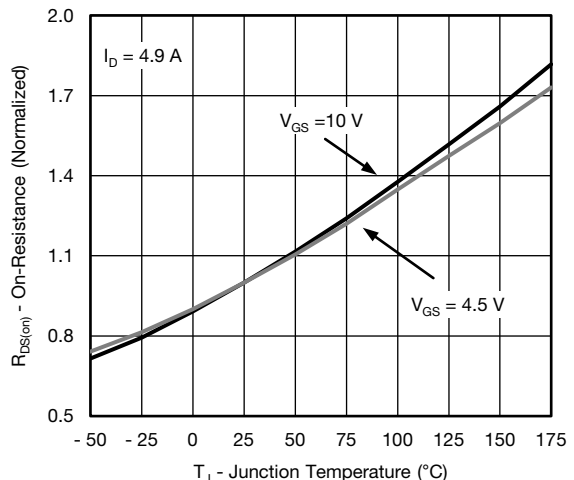
On-Resistance vs. Drain Current



Capacitance



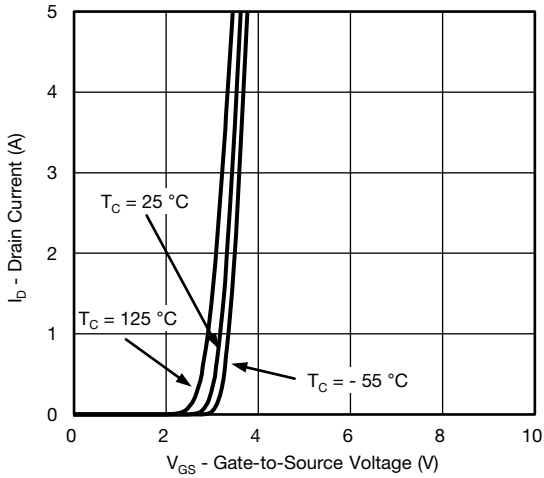
Gate Charge



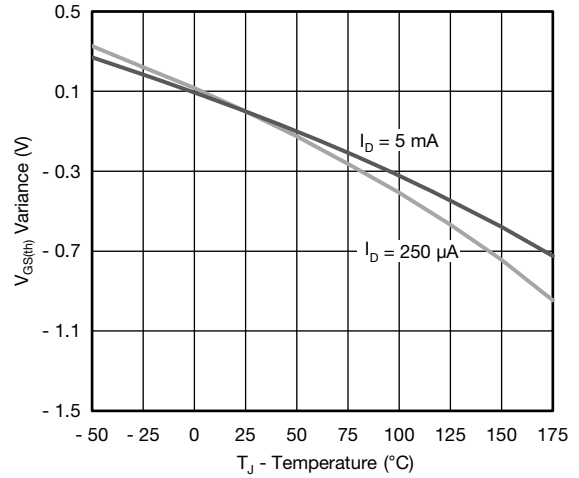
On-Resistance vs. Junction Temperature



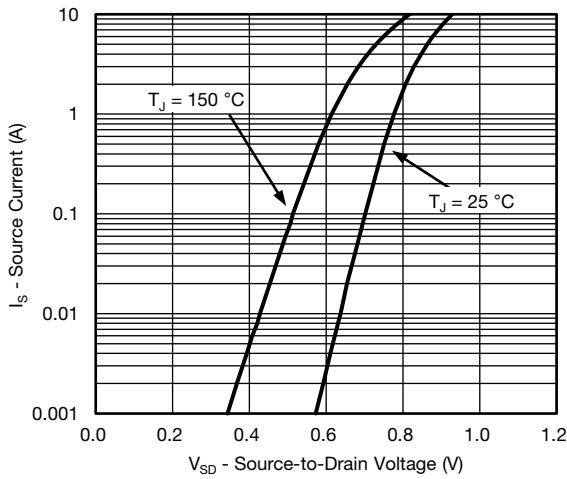
N-CHANNEL TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



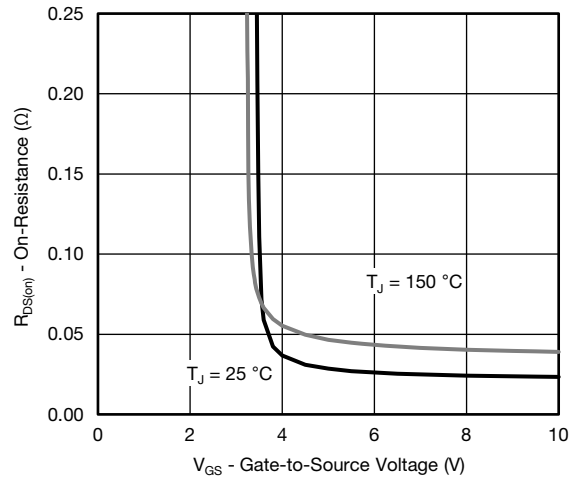
Transfer Characteristics



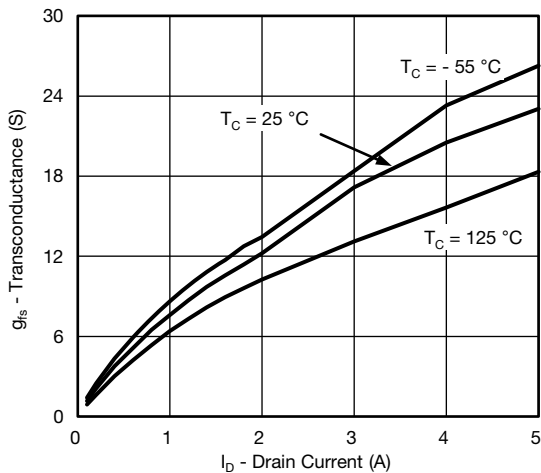
Threshold Voltage



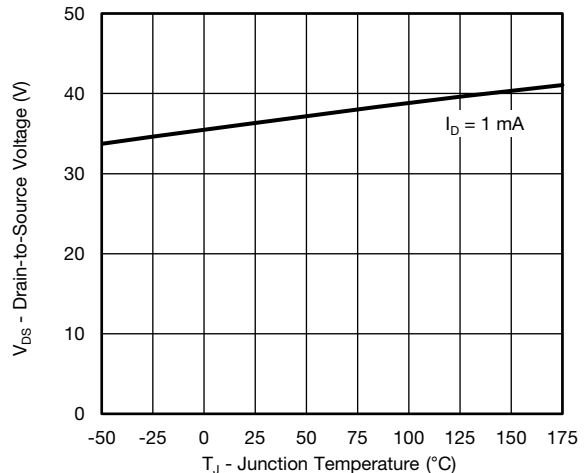
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



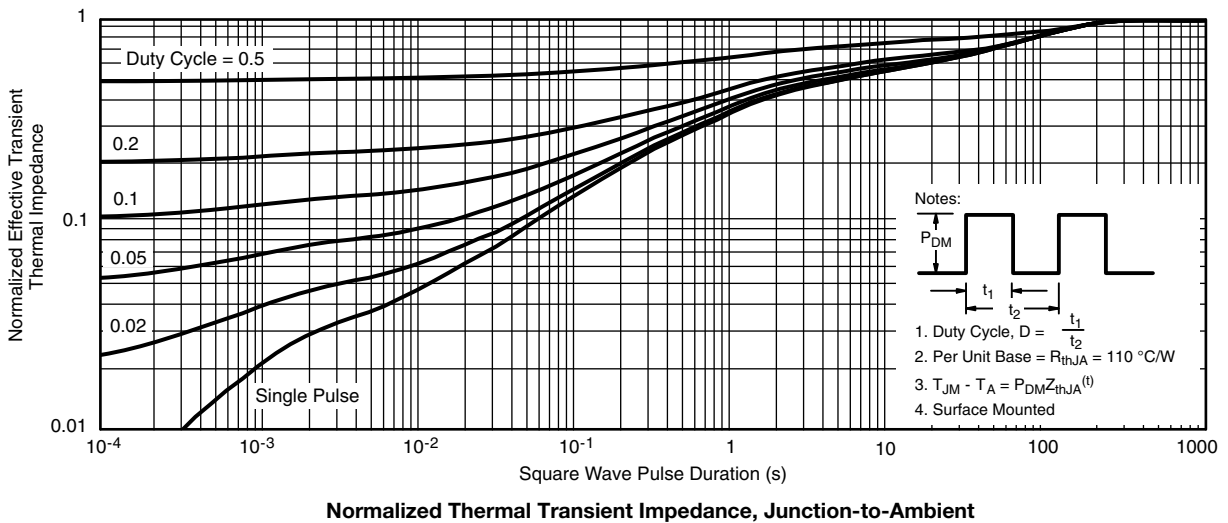
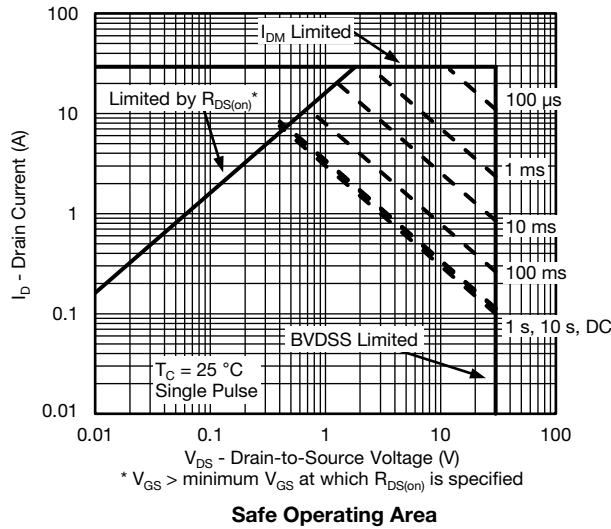
Transconductance



Drain Source Breakdown vs. Junction Temperature

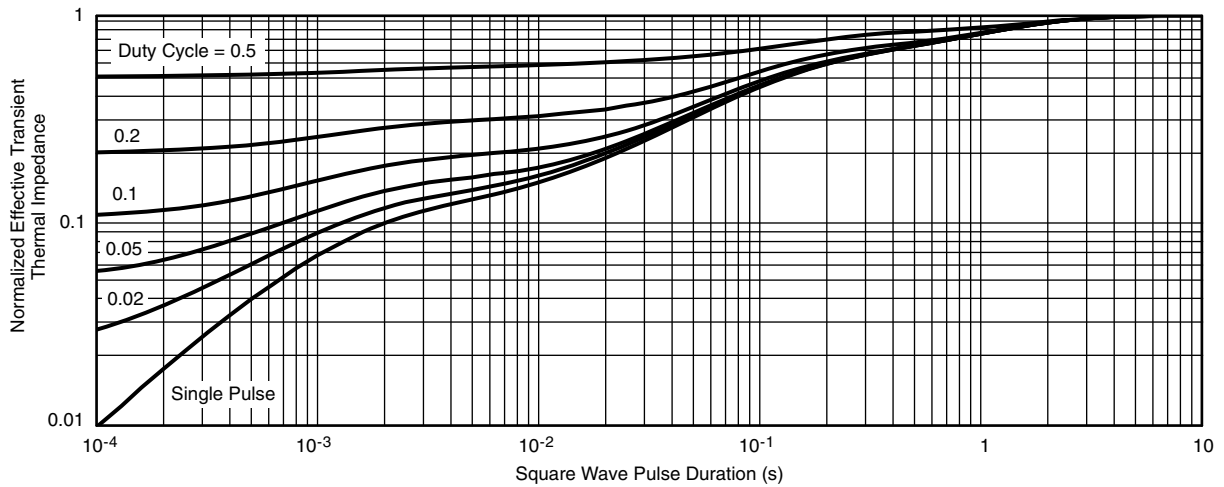


N-CHANNEL THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)





N-CHANNEL THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



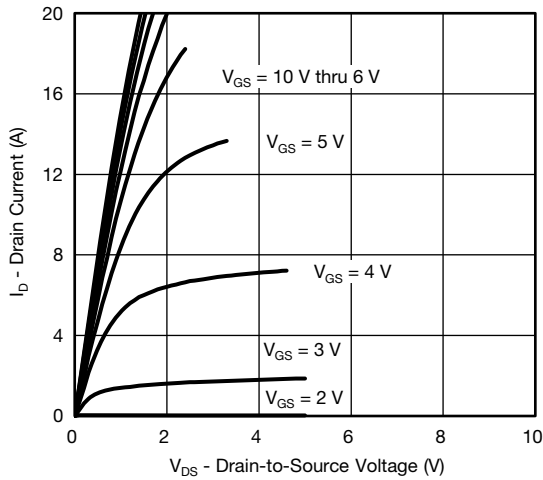
Normalized Thermal Transient Impedance, Junction-to-Foot

Note

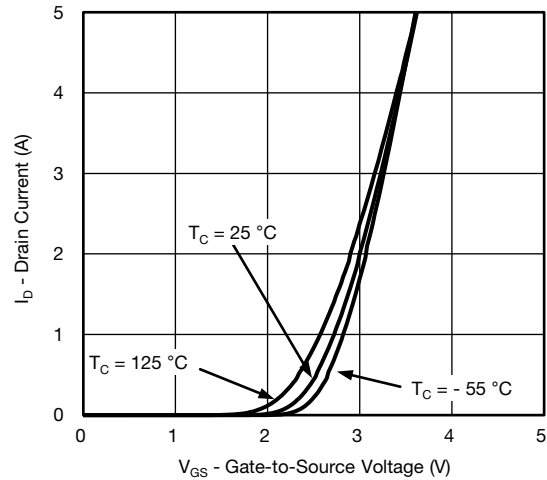
- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
 - Normalized Transient Thermal Impedance Junction-to-Case (25 °C)are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.



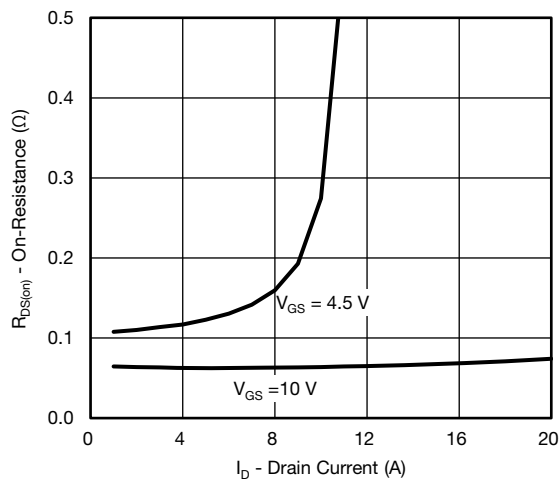
P-CHANNEL TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



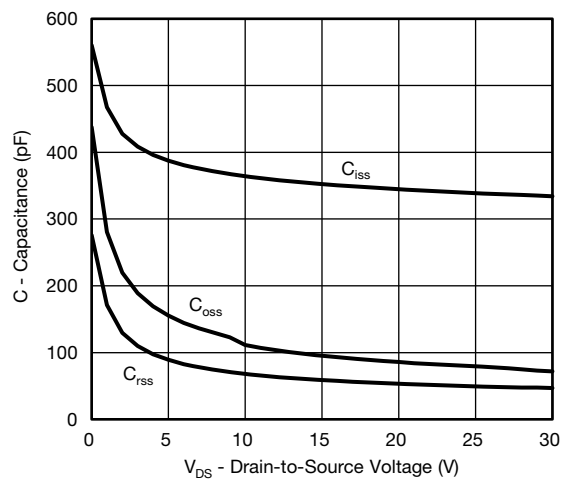
Output Characteristics



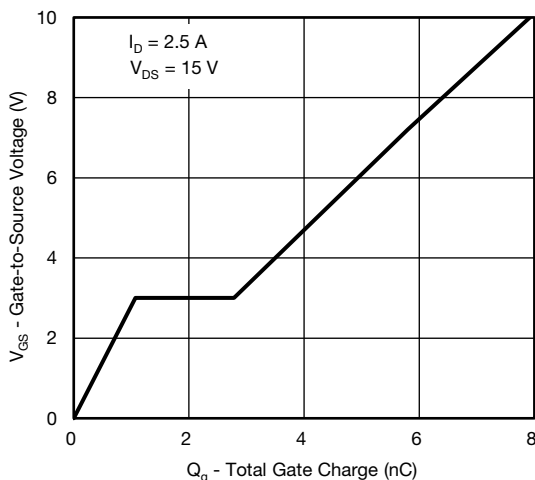
Transfer Characteristics



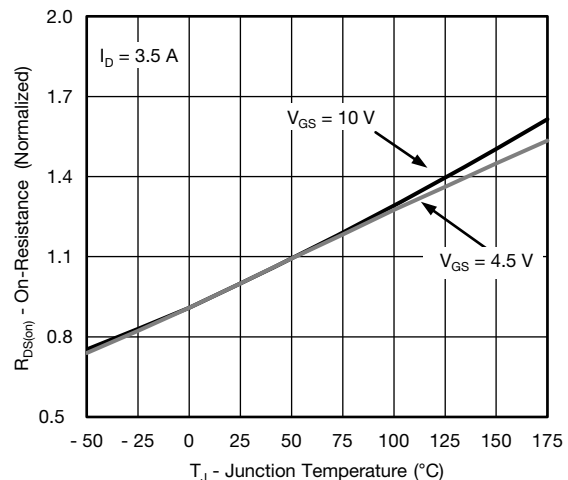
On-Resistance vs. Drain Current



Capacitance



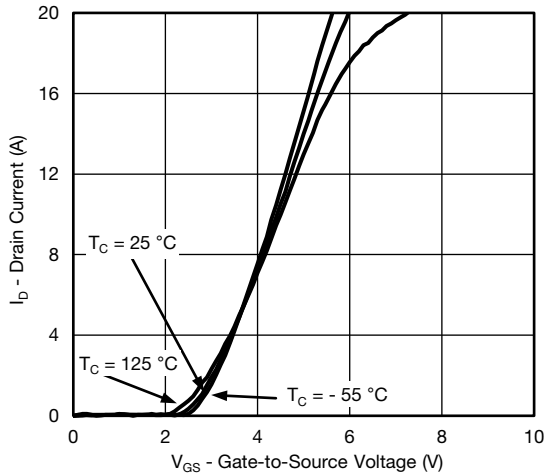
Gate Charge



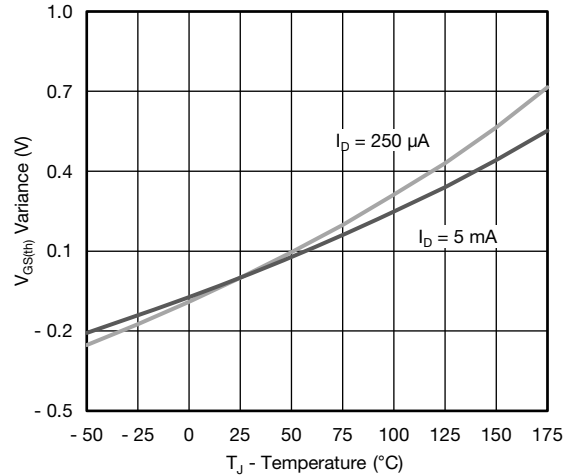
On-Resistance vs. Junction Temperature



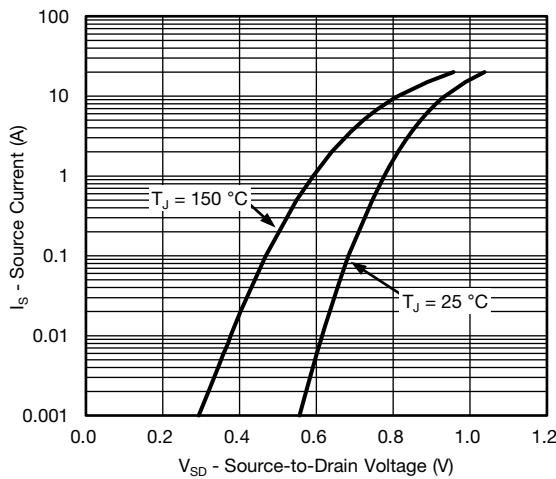
P-CHANNEL TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



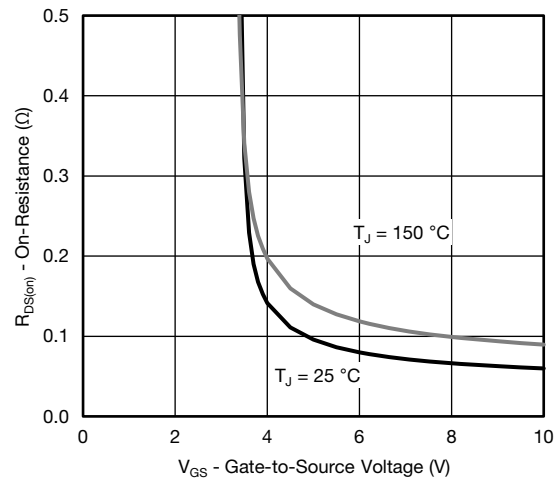
Transfer Characteristics



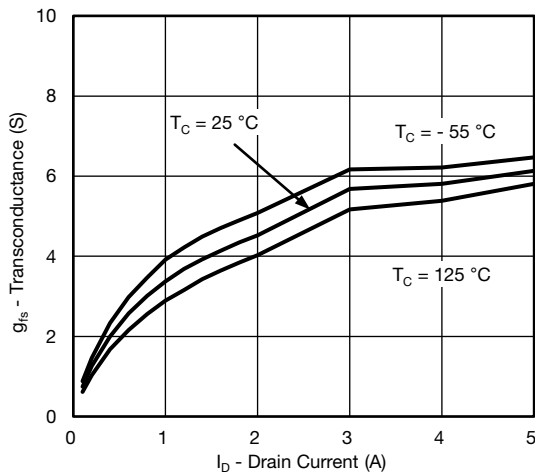
Threshold Voltage



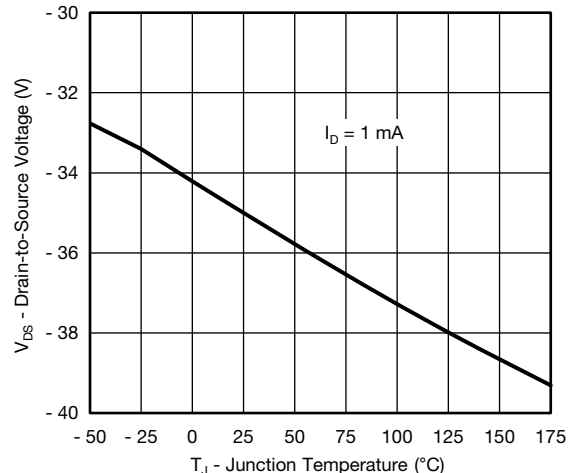
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



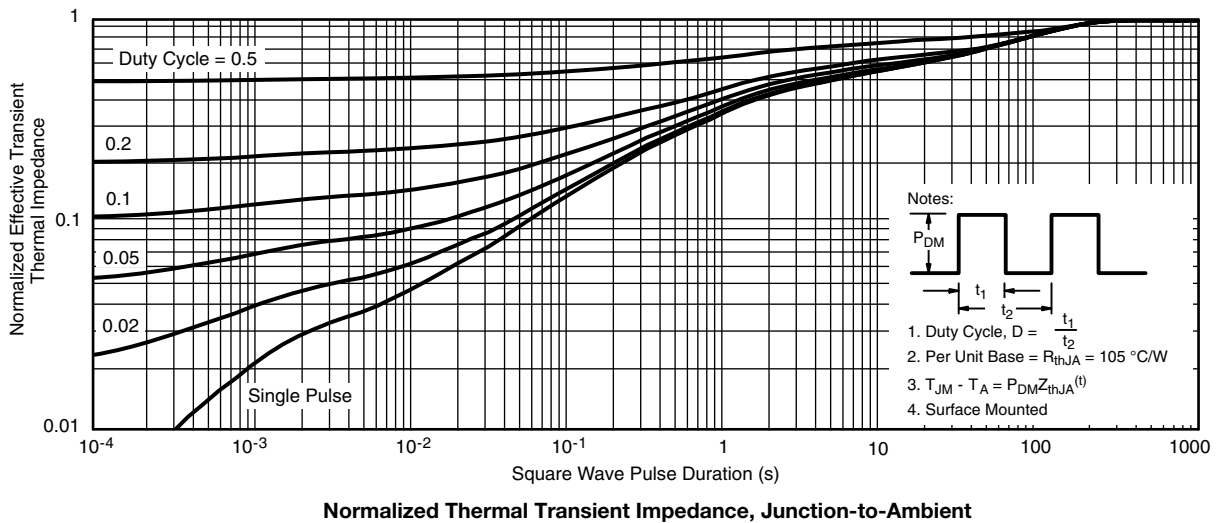
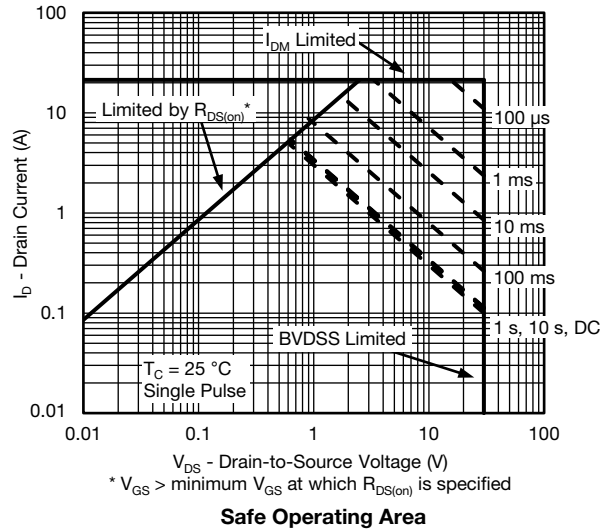
Transconductance



Drain Source Breakdown vs. Junction Temperature

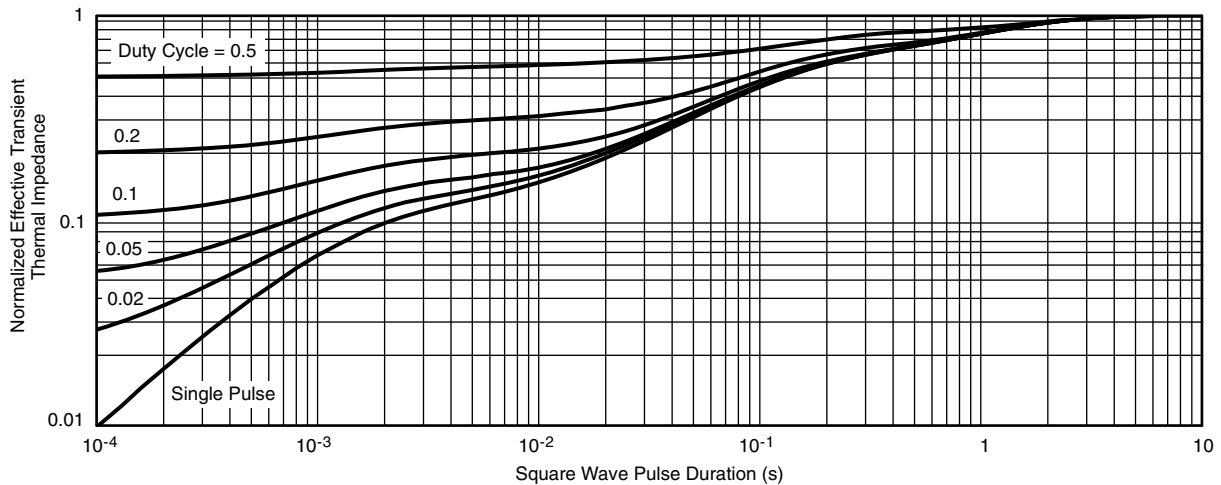


P-CHANNEL THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)





P-CHANNEL THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Foot

Note

- The characteristics shown in the two graphs
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 are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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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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