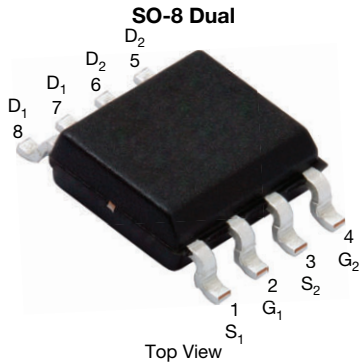


Automotive N-and P-Channel 30 V (D-S) 175 °C MOSFET



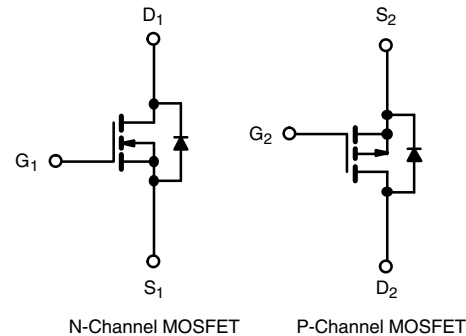
Marking Code: Q4532A

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	

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


ORDERING INFORMATION	
Package	SO-8
Lead (Pb)-free and halogen-free	SQ4532AEY (for detailed order number please see www.vishay.com/doc?79771)

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}	10	-9		
Single pulse avalanche energy	E_{AS}	5	4	mJ	
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	-	-
		$V_{GS} = 0, I_D = -250\text{ }\mu\text{A}$		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
				P-Ch	-	-	± 100
Zero gate voltage drain current	I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 30\text{ V}$	N-Ch	-	-	1
		$V_{GS} = 0\text{ V}$	$V_{DS} = -30\text{ V}$	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	-	-
		$V_{GS} = -10\text{ V}$	$V_{DS} = -5\text{ V}$	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
		$V_{GS} = -10\text{ V}$	$I_D = -3.5\text{ A}$	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	-
		$V_{DS} = -15\text{ V}, I_D = -3.5\text{ A}$		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
		$V_{GS} = 0\text{ V}$	$V_{DS} = -15\text{ V}, f = 1\text{ MHz}$	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
		$V_{GS} = -10\text{ V}$	$V_{DS} = -15\text{ V}, I_D = -2.5\text{ A}$	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
				P-Ch	2.8	5.8	8.6



SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$	N-Ch	-	7	10	ns
		$V_{DD} = -15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \cong -1\text{ A}$, $V_{GEN} = -10\text{ V}$, $R_g = 1\text{ }\Omega$	P-Ch	-	6	9	
Rise time	t_r	$V_{DD} = 15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$	N-Ch	-	17	21	
		$V_{DD} = -15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \cong -1\text{ A}$, $V_{GEN} = -10\text{ V}$, $R_g = 1\text{ }\Omega$	P-Ch	-	17	21	
Turn-off delay time	$t_{d(off)}$	$V_{DD} = 15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$	N-Ch	-	10	14	
		$V_{DD} = -15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \cong -1\text{ A}$, $V_{GEN} = -10\text{ V}$, $R_g = 1\text{ }\Omega$	P-Ch	-	19	24	
Fall time	t_f	$V_{DD} = 15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$	N-Ch	-	19	24	
		$V_{DD} = -15\text{ V}$, $R_L = 15\text{ }\Omega$ $I_D \cong -1\text{ A}$, $V_{GEN} = -10\text{ V}$, $R_g = 1\text{ }\Omega$	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}	$I_S = 2\text{ A}$	N-Ch	-	0.8	1.2	V
		$I_S = -1.5\text{ A}$	P-Ch	-	-0.8	-1.2	

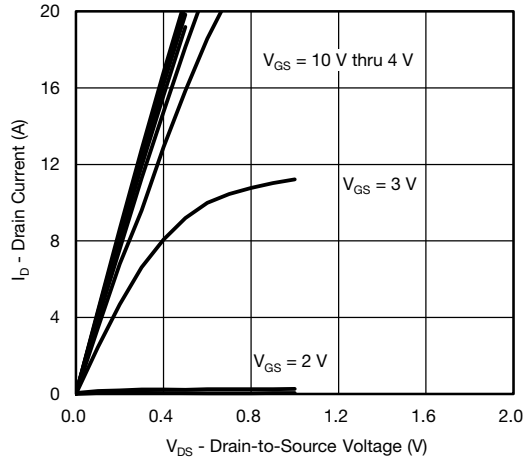
Notes

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

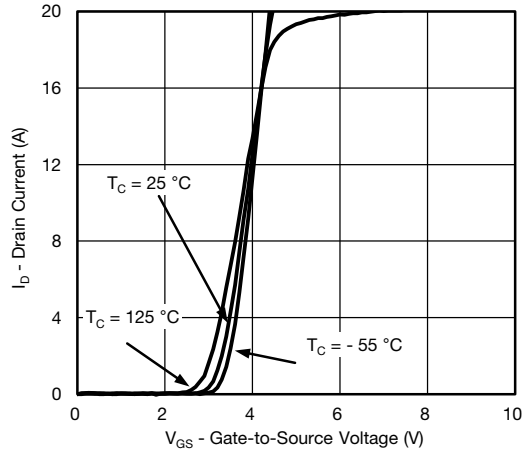
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



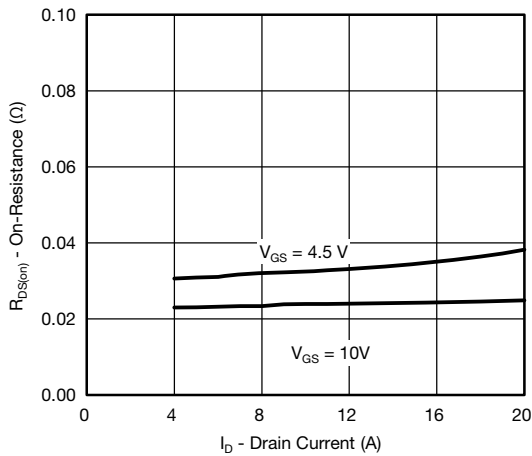
N-CHANNEL TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



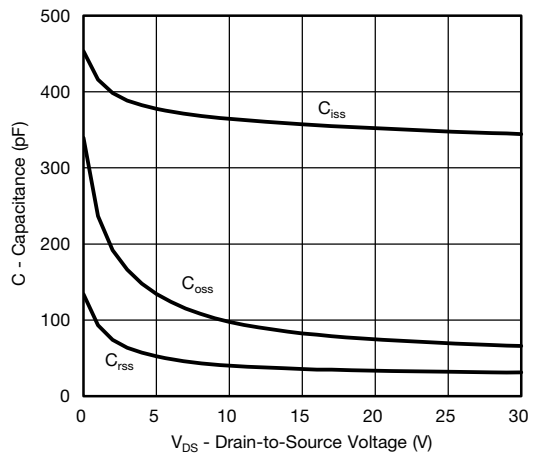
Output Characteristics



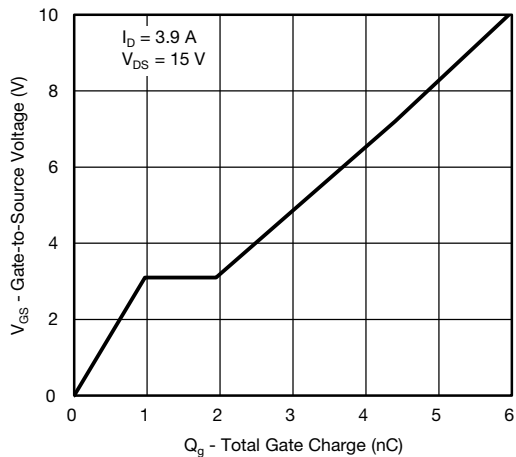
Transfer Characteristics



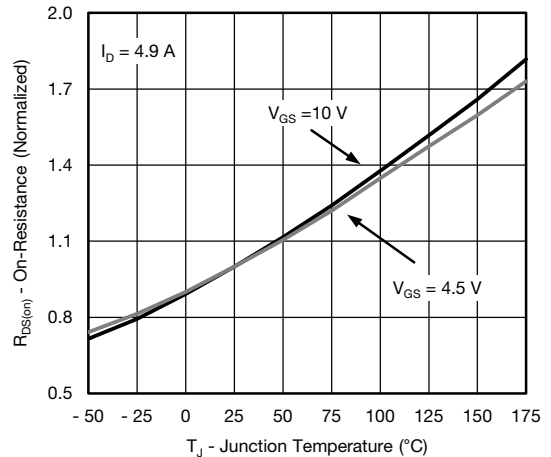
On-Resistance vs. Drain Current



Capacitance



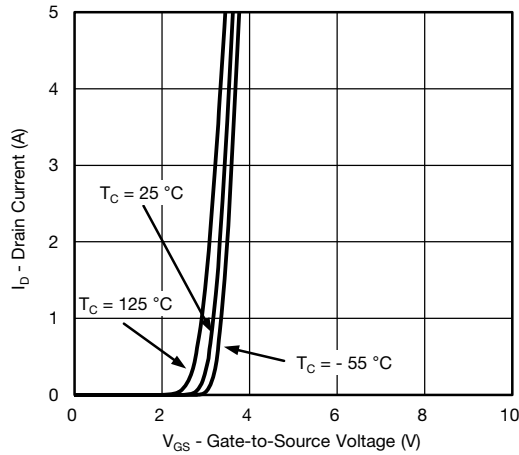
Gate Charge



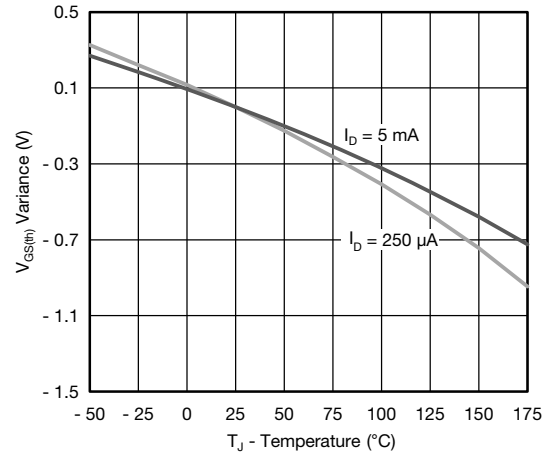
On-Resistance vs. Junction Temperature



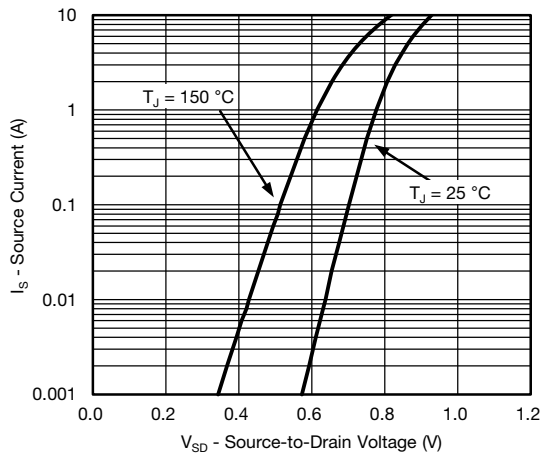
N-CHANNEL TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



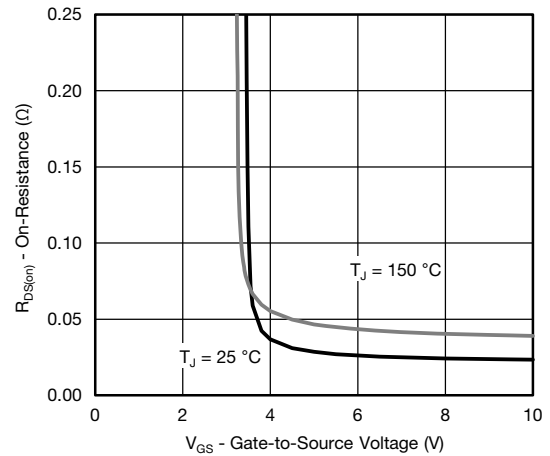
Transfer Characteristics



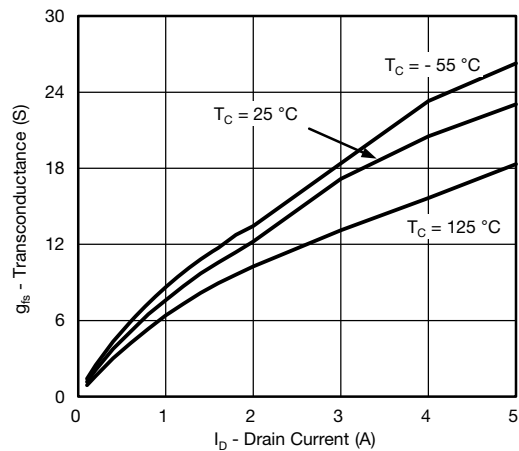
Threshold Voltage



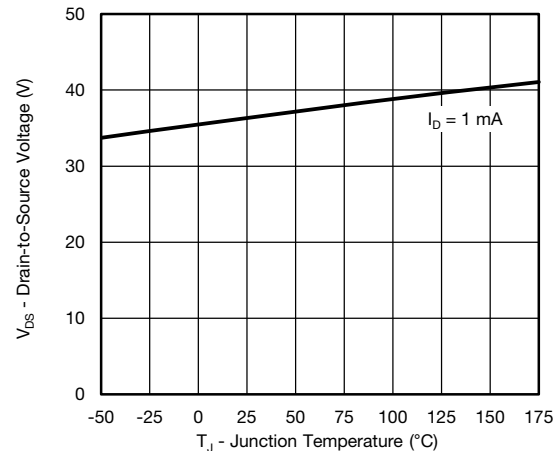
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



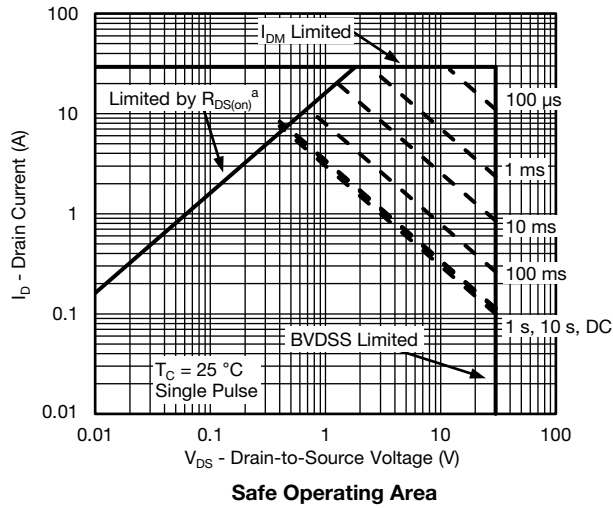
Transconductance



Drain Source Breakdown vs. Junction Temperature



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

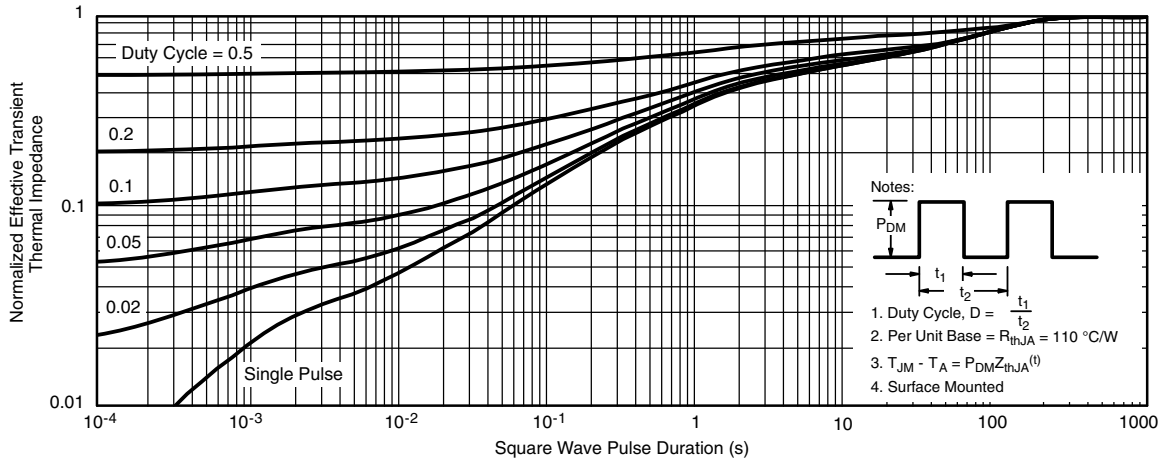


Note

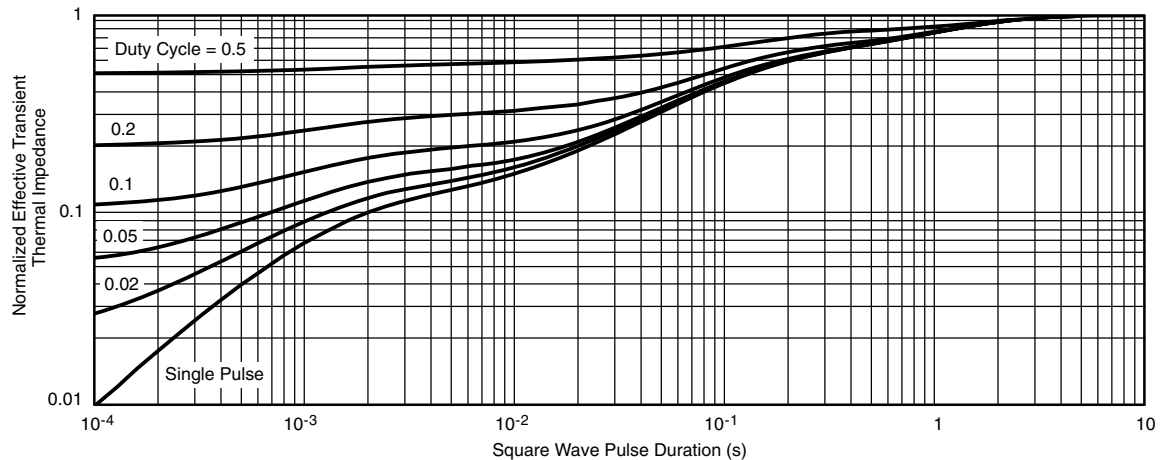
a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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



Normalized Thermal Transient Impedance, Junction-to-Ambient



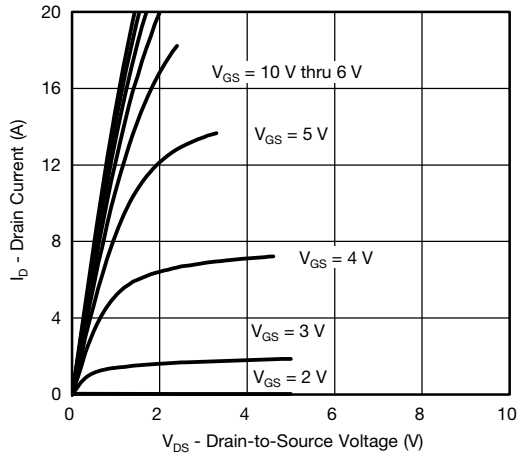
Normalized Thermal Transient Impedance, Junction-to-Foot

Note

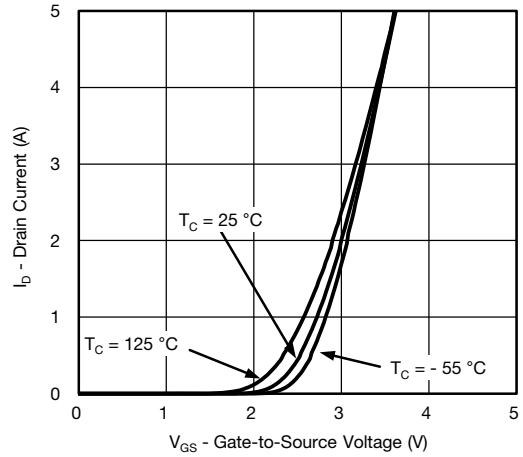
- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient ($25\text{ }^\circ\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Case ($25\text{ }^\circ\text{C}$)
 are given for general guidelines only to enable the user to get a “ball park” 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.



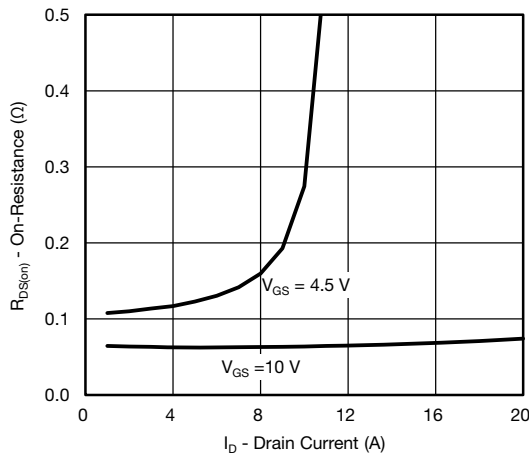
P-CHANNEL TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



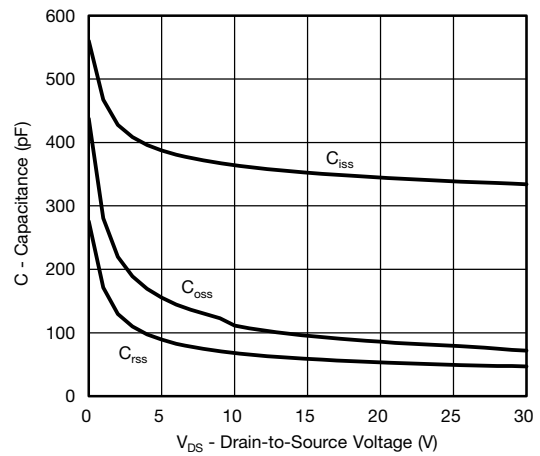
Output Characteristics



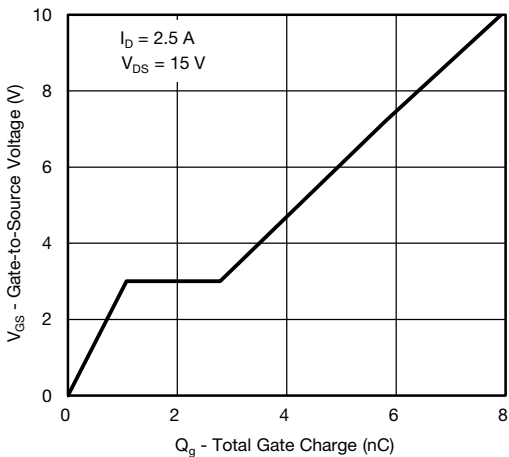
Transfer Characteristics



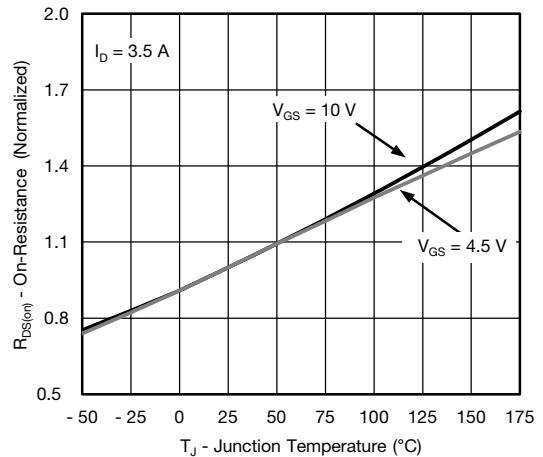
On-Resistance vs. Drain Current



Capacitance



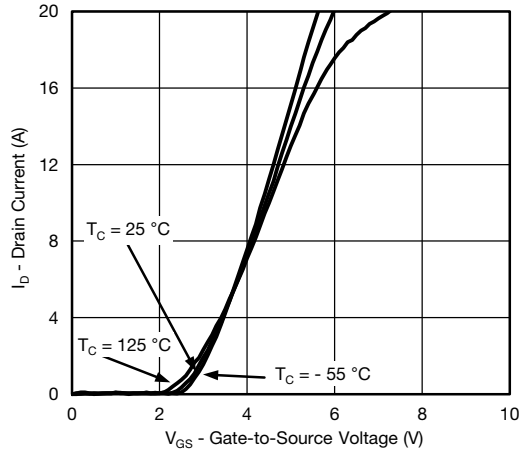
Gate Charge



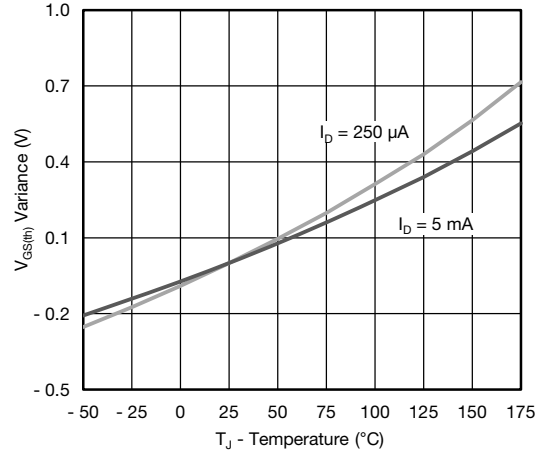
On-Resistance vs. Junction Temperature



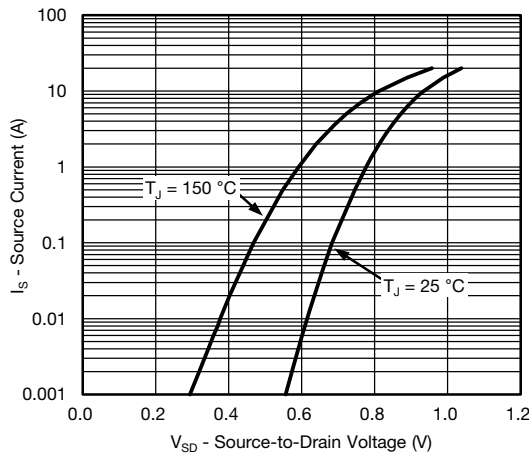
P-CHANNEL TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



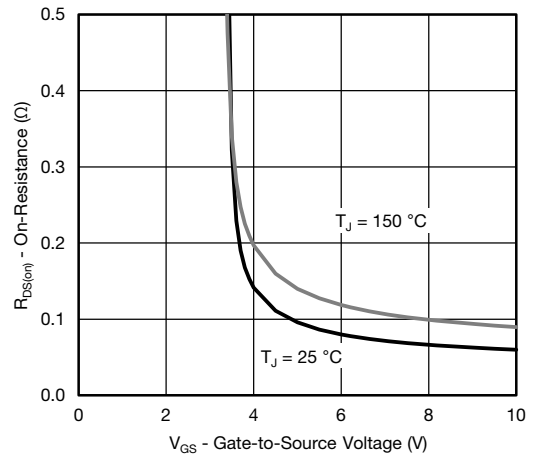
Transfer Characteristics



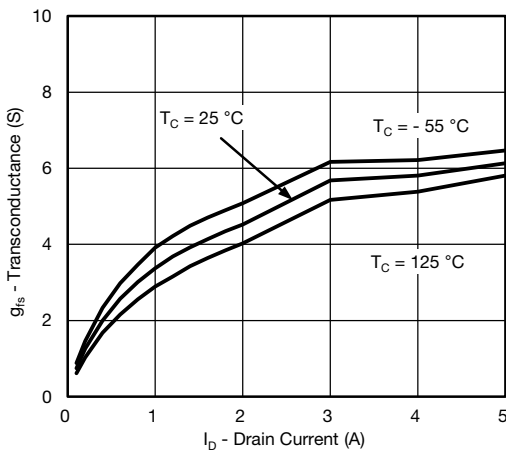
Threshold Voltage



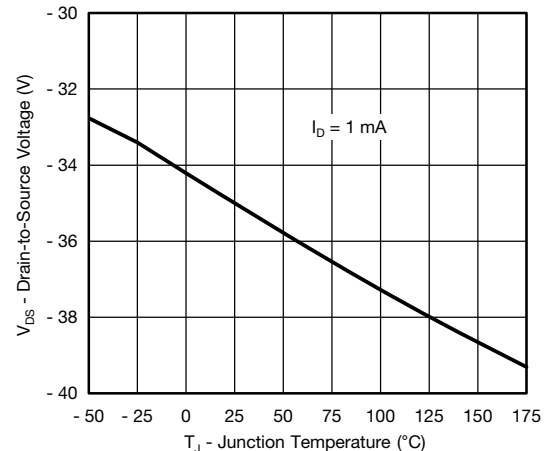
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



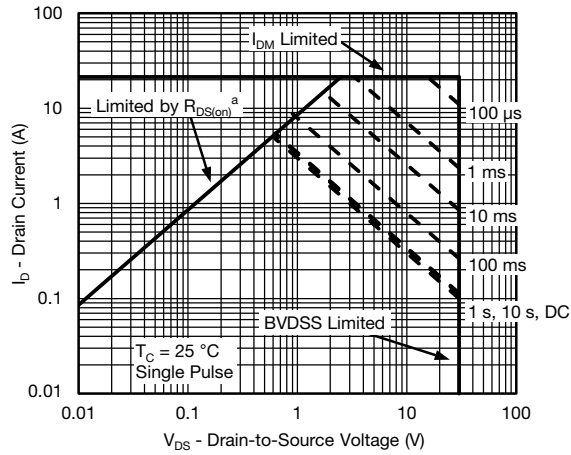
Transconductance



Drain Source Breakdown vs. Junction Temperature



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



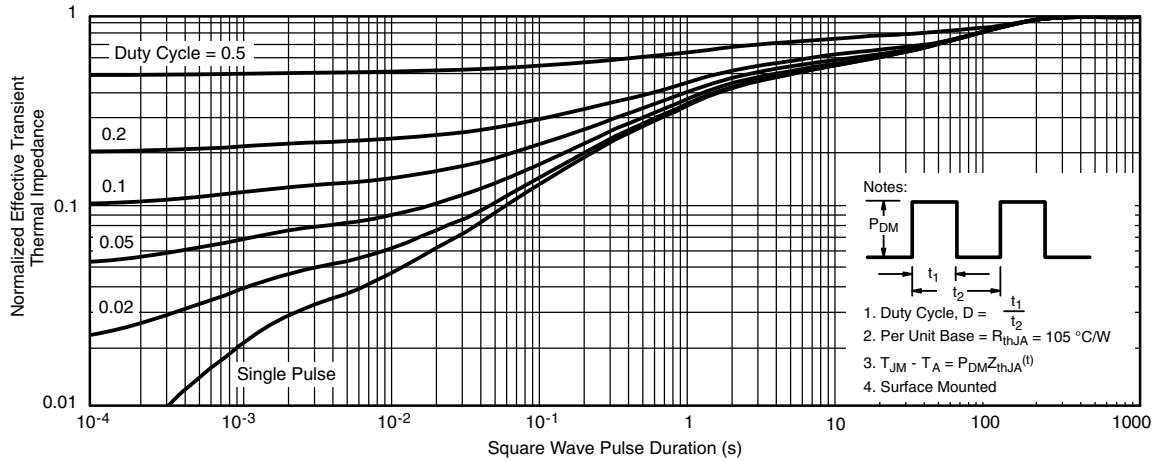
Safe Operating Area

Note

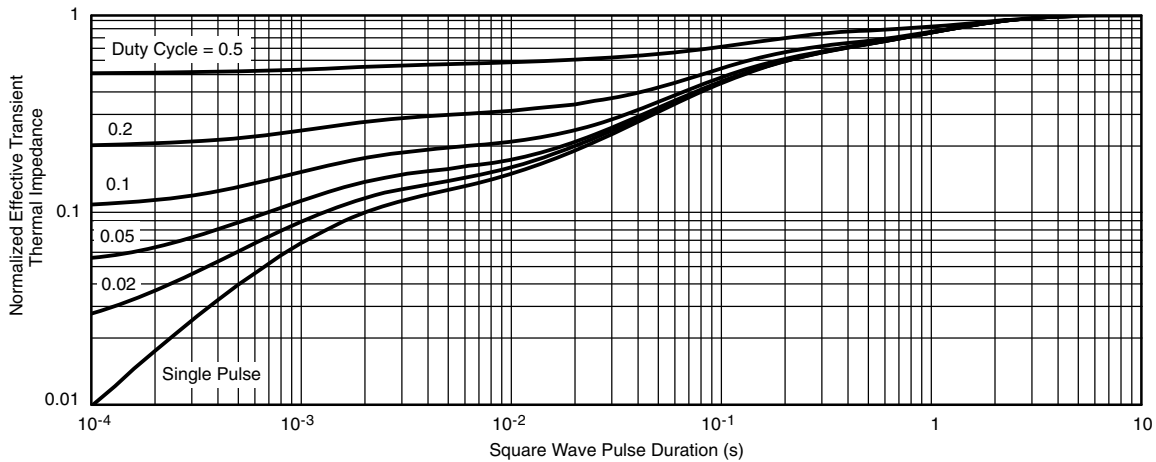
a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



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



Normalized Thermal Transient Impedance, Junction-to-Ambient



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.

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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)

[Return to Index](#)



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