

N-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A) ^a	Q_g (Typ.)
60	0.0033 at $V_{GS} = 10$ V	95	51 nC

FEATURES

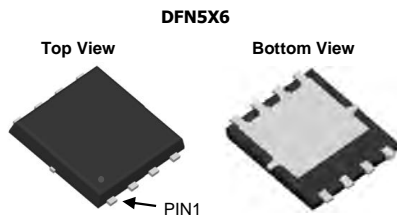
- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested

APPLICATIONS

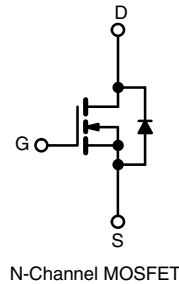
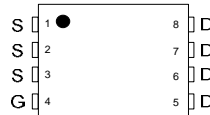
- Primary Side Switch
- Synchronous Rectifier
- DC/DC Converter
- DC/AC Inverters



RoHS
COMPLIANT



Top View



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	95 ^a
		$T_C = 70$ °C	88 ^a
		$T_A = 25$ °C	36.5 ^{b, c}
		$T_A = 70$ °C	27 ^{b, c}
Pulsed Drain Current ($t = 300$ μ s)	I_{DM}	360	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	95 ^a
		$T_A = 25$ °C	10.3 ^{b, c}
Single Pulse Avalanche Current	I_{AS}	93	mJ
Single Pulse Avalanche Energy	E_{AS}	295	mJ
Maximum Power Dissipation	P_D	$T_C = 25$ °C	173
		$T_C = 70$ °C	120
		$T_A = 25$ °C	5.4 ^{b, c}
		$T_A = 70$ °C	3.3 ^{b, c}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	14	23	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	0.8	1.5	°C/W

Notes:

a. Package limited.

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

c. $t = 10$ s.

d. Maximum under steady state conditions is 65 °C/W.

SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	60			V	
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA		- 6		mV/°C	
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1		3	V	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 48 V, V _{GS} = 0 V			1	μA	
		V _{DS} = 48 V, V _{GS} = 0 V, T _J = 55 °C			10		
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	125			A	
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.0033	0.0042	Ω	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A		70		S	
Dynamic ^b							
Input Capacitance	C _{iss}	V _{DS} = 30 V, V _{GS} = 0 V, f = 1 MHz		3115		pF	
Output Capacitance	C _{oss}			1350			
Reverse Transfer Capacitance	C _{rss}			98			
Total Gate Charge	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 10 A		51		nC	
Gate-Source Charge	Q _{gs}	V _{DS} = 30 V, V _{GS} = 4.5 V, I _D = 10 A		22			
Gate-Drain Charge	Q _{gd}			8.2			
Gate Resistance	R _g			4.5			
Turn-On Delay Time	t _{d(on)}	f = 1 MHz		2.2		Ω	
Rise Time	t _r	V _{DD} = 30 V, R _L = 3 Ω I _D ≅ 10 A, V _{GEN} = 10 V, R _g = 1 Ω		17		ns	
Turn-Off Delay Time	t _{d(off)}			8			
Fall Time	t _f			30			
Turn-On Delay Time	t _{d(on)}			8			
Rise Time	t _r	V _{DD} = 30 V, R _L = 3 Ω I _D ≅ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω		43			
Turn-Off Delay Time	t _{d(off)}			120			
Fall Time	t _f			32			
				9			
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			95		A
Pulse Diode Forward Current ^a	I _{SM}				360		
Body Diode Voltage	V _{SD}	I _S = 5 A		0.74	1.2	V	
Body Diode Reverse Recovery Time	t _{rr}	I _F = 10 A, dI/dt = 100 A/μs, T _J = 25 °C		40	86	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			33	74	nC	
Reverse Recovery Fall Time	t _a			17		ns	
Reverse Recovery Rise Time	t _b			26			

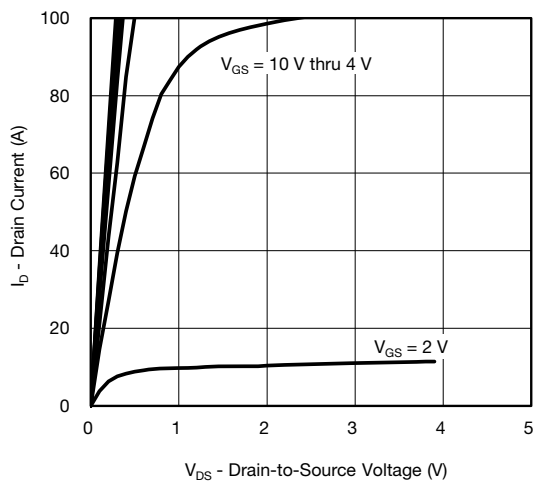
Notes:

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

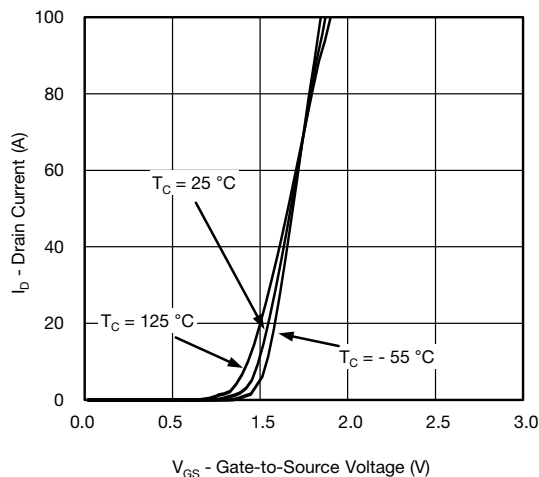
b. Guaranteed by design, not subject to production testing.

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.

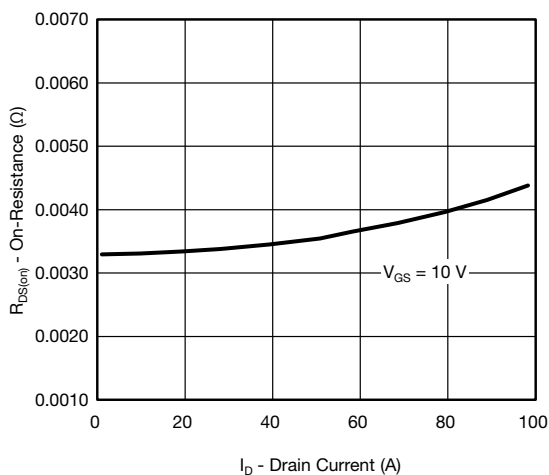
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



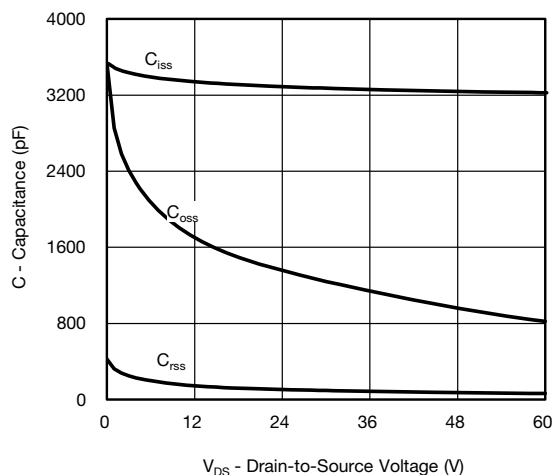
Output Characteristics



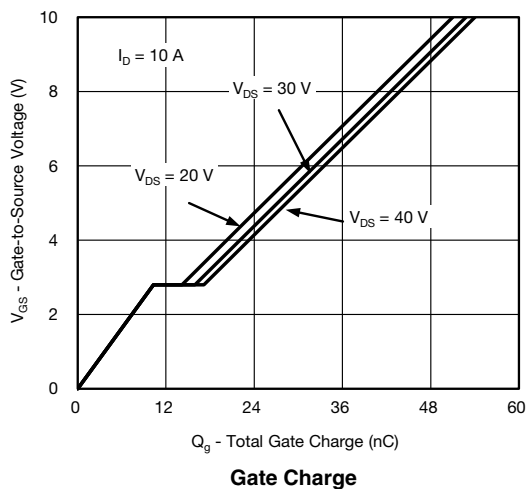
Transfer Characteristics



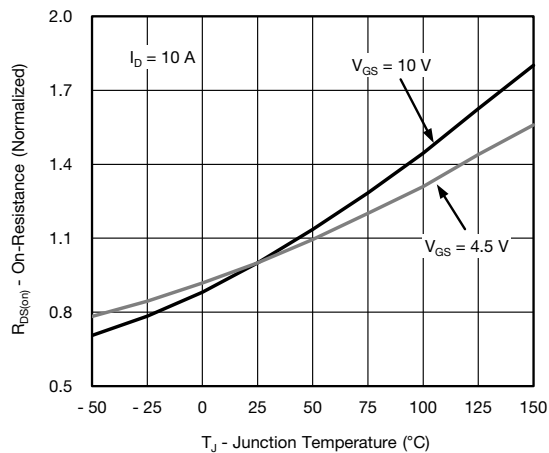
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

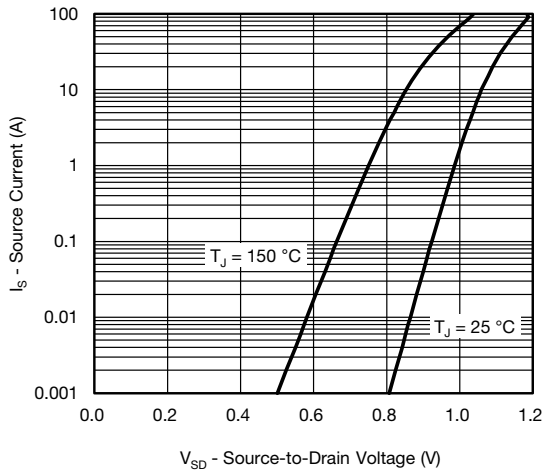


Gate Charge

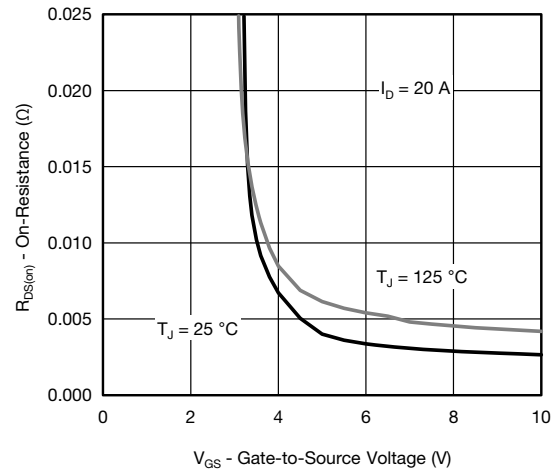


On-Resistance vs. Junction Temperature

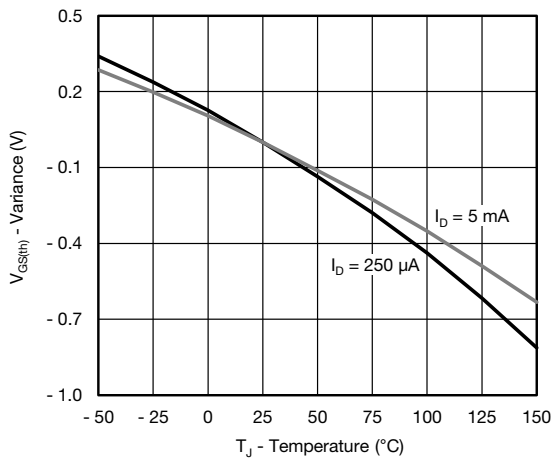
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



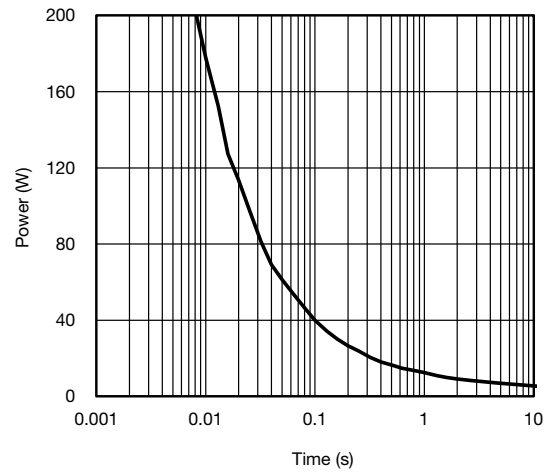
Source-Drain Diode Forward Voltage



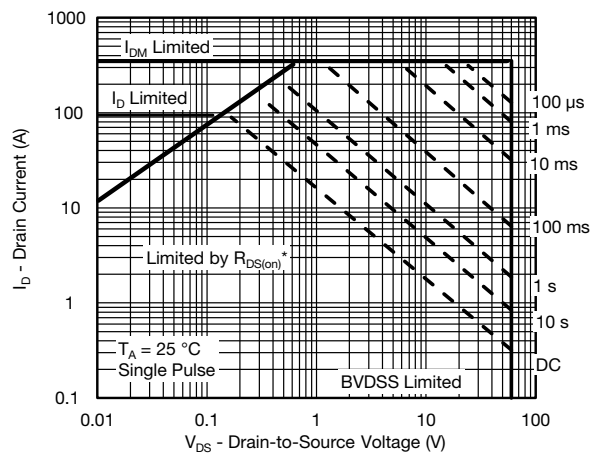
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



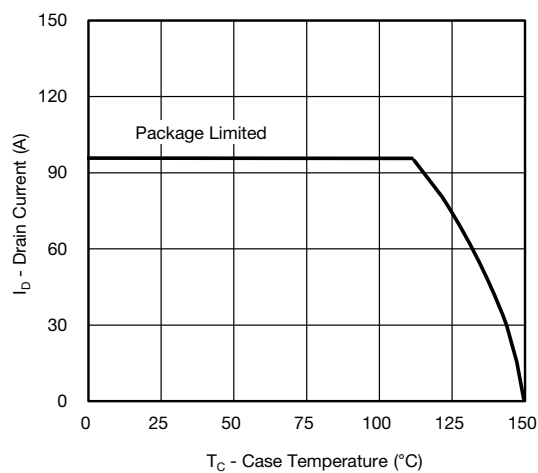
Single Pulse Power, Junction-to-Ambient



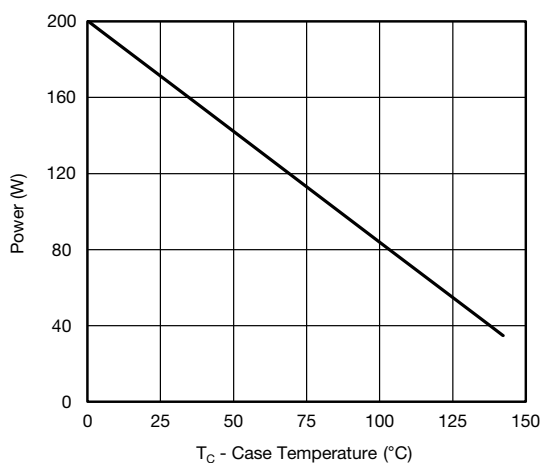
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

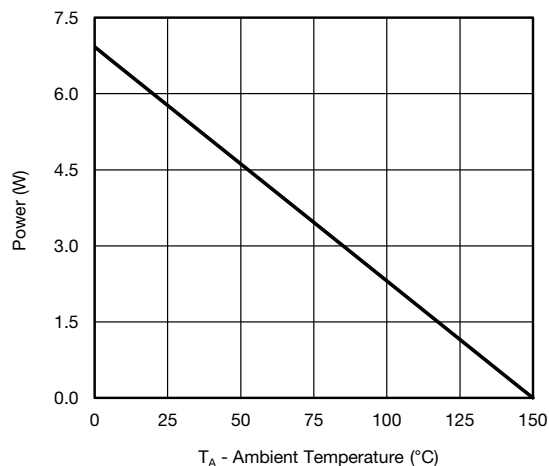
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



Power, Junction-to-Case



Power, 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.

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