

Dual N-Channel 30-V (D-S) MOSFET


RoHS
 COMPLIANT

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (m Ω)(Typ.)	I_D (A) ^d	Q_g (Typ.)
30	6 at $V_{GS} = 10$ V	50	20 nC

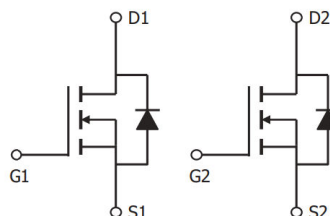
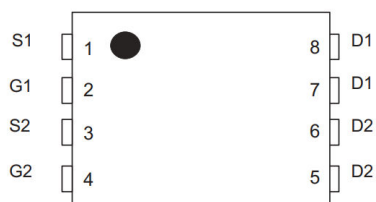
FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested
- AEC-Q101 Qualified for Automotive Applications

APPLICATIONS

- 12 V Automotive systems
- Motors, lamps and solenoid control
- Transmission control
- Ultra high performance power switching

Top View



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)	I_D	$T_C = 25$ °C	50 ^a
		$T_C = 70$ °C	41
		$T_A = 25$ °C	35 ^{b, c}
		$T_A = 70$ °C	27 ^{b, c}
Pulsed Drain Current	I_{DM}	200	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	50
		$T_A = 25$ °C	25 ^{b, c}
Avalanche Current	I_{AS}	55	
Single-Pulse Avalanche Energy	E_{AS}	105	mJ
Maximum Power Dissipation	P_D	$T_C = 25$ °C	83
		$T_C = 70$ °C	57
		$T_A = 25$ °C	59 ^{b, c}
		$T_A = 70$ °C	45 ^{b, c}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	30	45	°C/W
Maximum Junction-to-Foot (Drain)	R_{thJF}	2.8	6	

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- Maximum under Steady State conditions is 85 °C/W.

SPECIFICATIONS T _J = 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
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		55		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 6.3		
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} = 24V, V _{GS} = 0 V			1	μA
		V _{DS} = 24 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	50			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 10A		6	7.5	mΩ
		V _{GS} = 4.5 V, I _D = 5A		8	10	
Forward Transconductance ^a	g _{fs}	V _{DS} = 24 V, I _D = 10A		50		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 24 V, V _{GS} = 0 V, f = 1 MHz		1250		pF
Output Capacitance	C _{oss}			127		
Reverse Transfer Capacitance	C _{rss}			41		
Total Gate Charge	Q _g	V _{DS} = 24 V, V _{GS} = 10V, I _D = 10 A		20		nC
Gate-Source Charge	Q _{gs}			5.5		
Gate-Drain Charge	Q _{gd}			12		
Gate Resistance	R _g	f = 1 MHz		2.5		Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 24 V, R _L = 5.4 Ω I _D ≅ 5 A, V _{GEN} = 4.5 V, R _g = 1 Ω		15		ns
Rise Time	t _r			10		
Turn-Off DelayTime	t _{d(off)}			45		
Fall Time	t _f			11		
Turn-On Delay Time	t _{d(on)}	V _{DD} = 24 V, R _L = 5.4 Ω I _D ≅ 10 A, V _{GEN} = 10 V, R _g = 1 Ω		10		
Rise Time	t _r			8		
Turn-Off DelayTime	t _{d(off)}			19		
Fall Time	t _f			7		
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I _S	T _C = 25 °C			50	A
Pulse Diode Forward Current ^a	I _{SM}				200	
Body Diode Voltage	V _{SD}	I _S = 2 A		0.7	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 5.5 A, dI/dt = 100 A/μs, T _J = 25 °C		28	50	ns
Body Diode Reverse Recovery Charge	Q _{rr}			26	50	nC
Reverse Recovery Fall Time	t _a			19		ns
Reverse Recovery Rise Time	t _b			6		

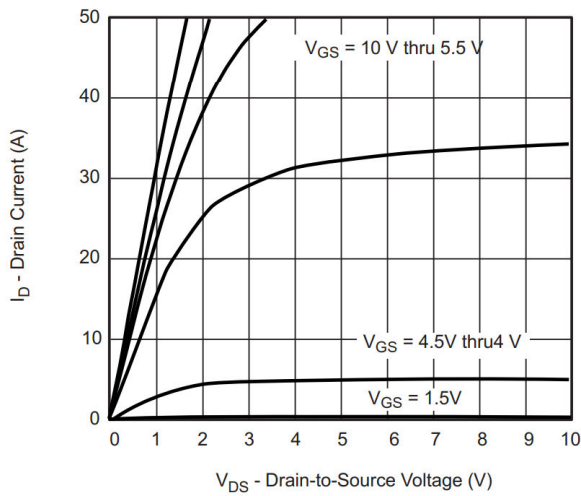
Notes:

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

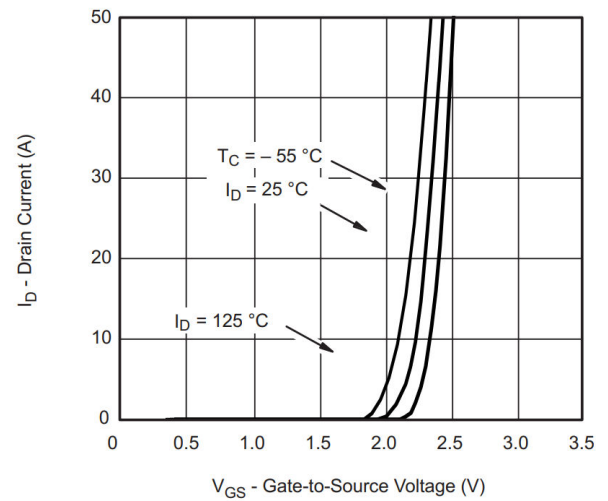
b. Guaranteed by design, not subject to production testing.

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.

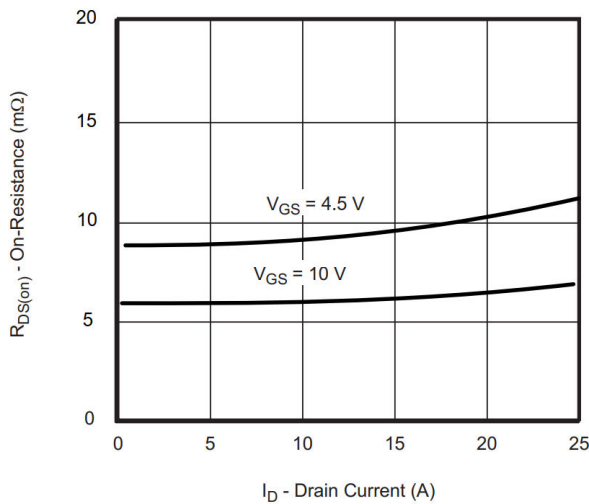
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



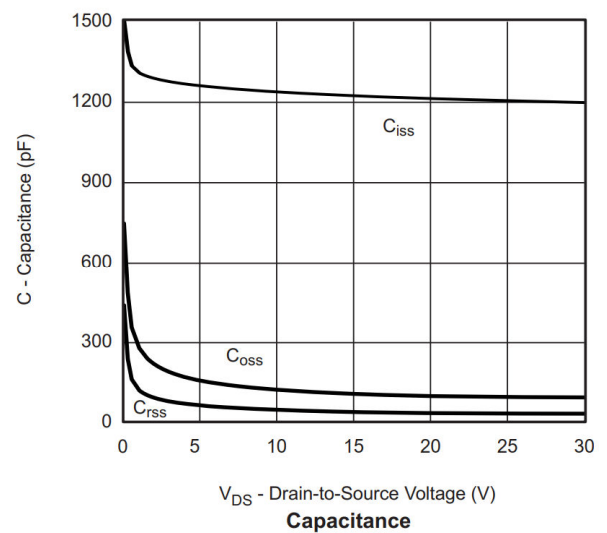
Output Characteristics



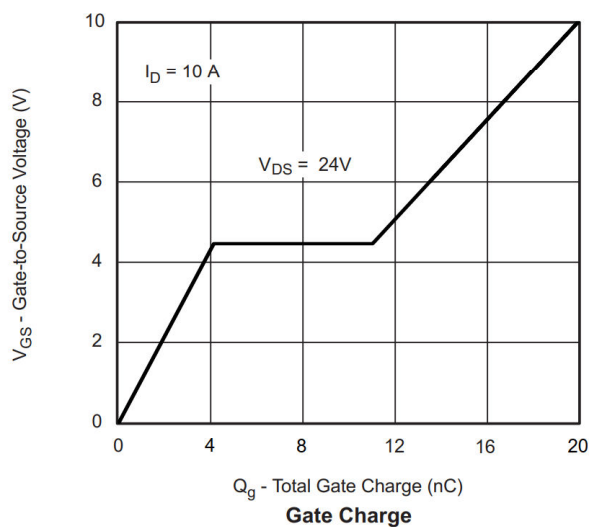
Transfer Characteristics



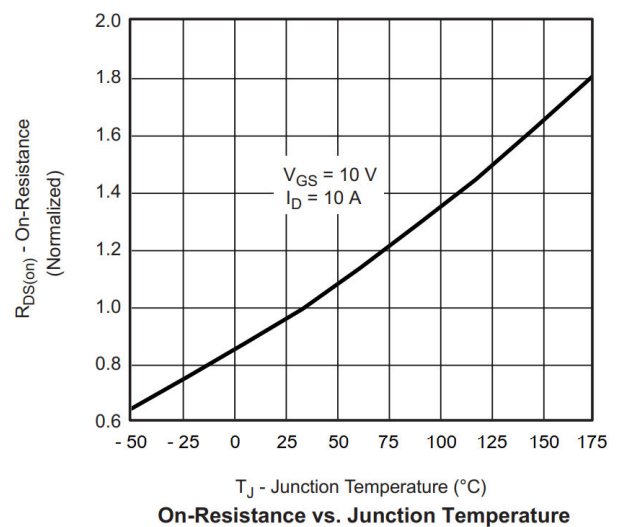
On-Resistance vs. Drain Current



Capacitance

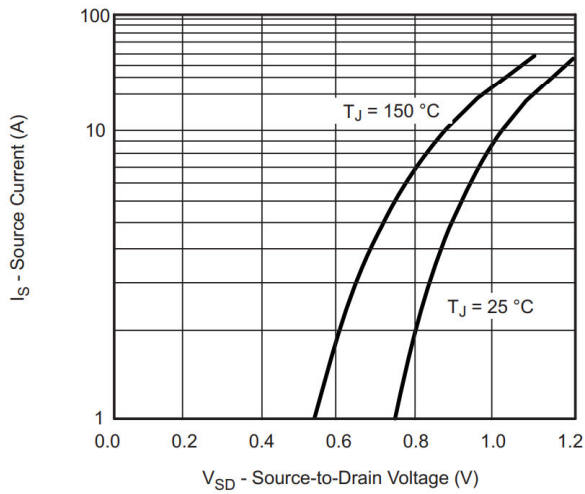


Gate Charge

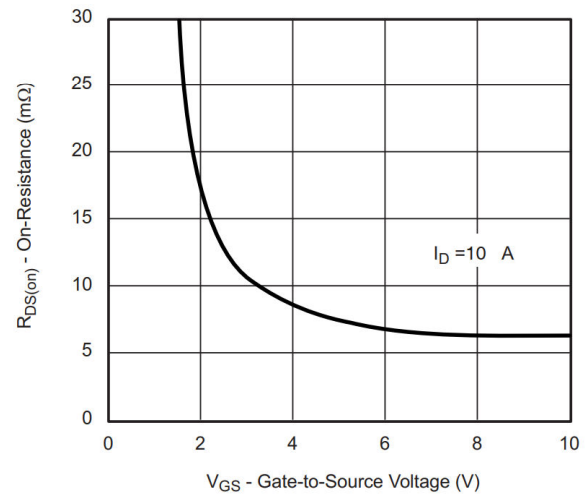


On-Resistance vs. Junction Temperature

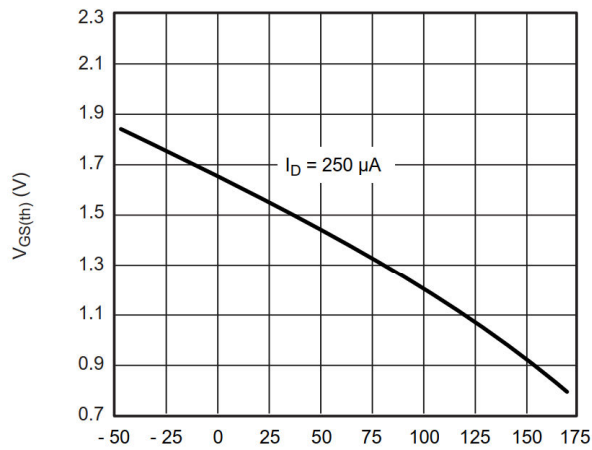
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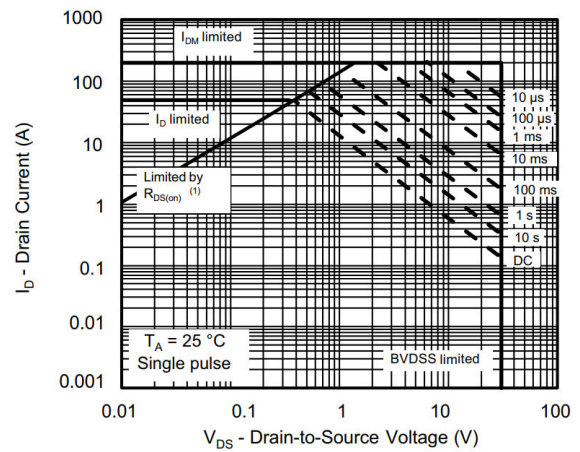
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

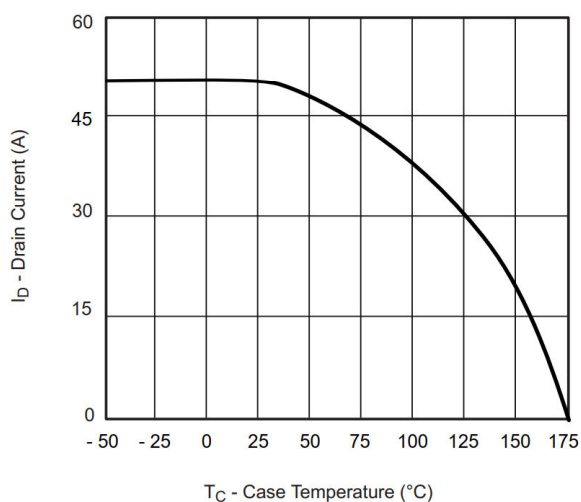


Threshold Voltage

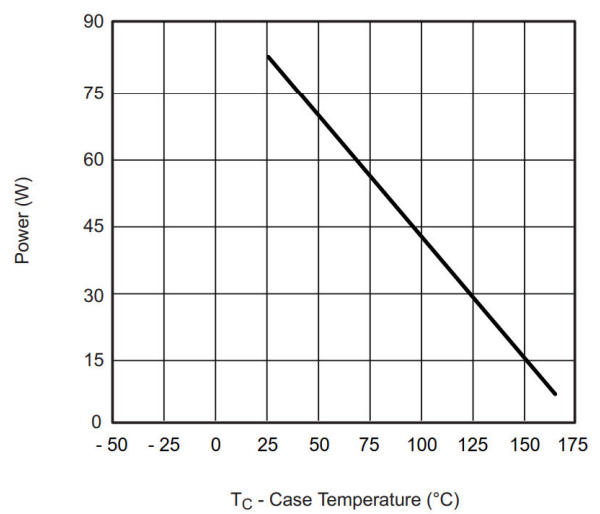


(1) $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient



Current Derating*



Power, Junction-to-Foot

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