



N-Channel 40-V (D-S) 175°C MOSFET

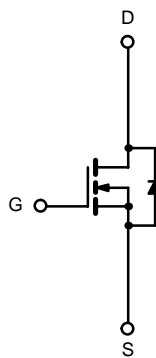
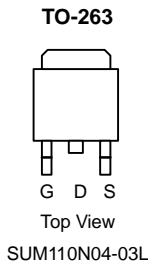
PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
40	0.0035 @ $V_{GS} = 10$ V	110 ^a
	0.0053 @ $V_{GS} = 4.5$ V	

FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature

APPLICATIONS

- Automotive Applications Such As:
 - ABS
 - 12-V EPS
 - Motor Drives
- Industrial



ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 175^\circ\text{C}$)	$T_C = 25^\circ\text{C}$	I_D	110 ^a	A
	$T_C = 125^\circ\text{C}$		102 ^a	
Pulsed Drain Current		I_{DM}	300	
Avalanche Current		I_{AR}	55	
Repetitive Avalanche Energy ^b		E_{AR}	151	mJ
$L = 0.1$ mH				
Maximum Power Dissipation ^p	$T_C = 25^\circ\text{C}$	P_D	230 ^c	W
	$T_A = 25^\circ\text{C}^d$		3.75	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS				
Parameter		Symbol	Limit	Unit
Junction-to-Ambient	PCB Mount ^d	R_{thJA}	40	$^\circ\text{C/W}$
Junction-to-Case				

Notes

- a. Package limited.
- b. Duty cycle $\leq 1\%$.
- c. See SOA curve for voltage derating.
- d. When mounted on 1" square PCB (FR-4 material).



SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{DS} = 0 V, I _D = 250 μA	40			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1		3	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 40 V, V _{GS} = 0 V			1	μA
		V _{DS} = 40 V, V _{GS} = 0 V, T _J = 125 °C			50	
		V _{DS} = 40 V, V _{GS} = 0 V, T _J = 175 °C			250	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	120			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 30 A		0.0029	0.0035	Ω
		V _{GS} = 4.5 V, I _D = 20 A		0.0042	0.0053	
		V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C			0.0055	
		V _{GS} = 10 V, I _D = 30 A, T _J = 175 °C			0.0066	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A	30			S
Dynamic^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		4800		pF
Output Capacitance	C _{oss}			1010		
Reverse Transfer Capacitance	C _{rss}			560		
Total Gate Charge ^c	Q _g	V _{DS} = 30 V, V _{GS} = 10 V, I _D = 110 A		110	165	nC
Gate-Source Charge ^c	Q _{gs}			17		
Gate-Drain Charge ^c	Q _{gd}			35		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 0.35 Ω I _D ≅ 110 A, V _{GEN} = 10 V, R _G = 2.5 Ω		15	25	ns
Rise Time ^c	t _r			20	30	
Turn-Off Delay Time ^c	t _{d(off)}			50	75	
Fall Time ^c	t _f			100	150	
Source-Drain Diode Ratings and Characteristics (T_C = 25 °C)^b						
Continuous Current	I _S				110	A
Pulsed Current	I _{SM}				300	
Forward Voltage ^a	V _{SD}	I _F = 110 A, V _{GS} = 0 V		1.1	1.4	V
Reverse Recovery Time	t _{rr}	I _F = 110 A, di/dt = 100 A/μs		45	70	ns
Peak Reverse Recovery Current	I _{RM(REC)}			1.5	2.3	A
Reverse Recovery Charge	Q _{rr}			0.034	0.081	μC

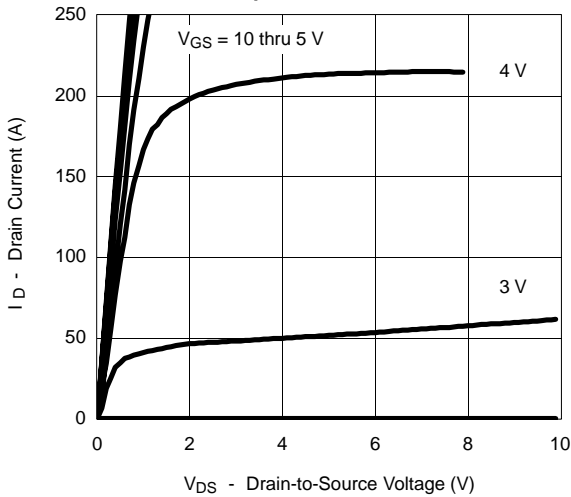
Notes

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

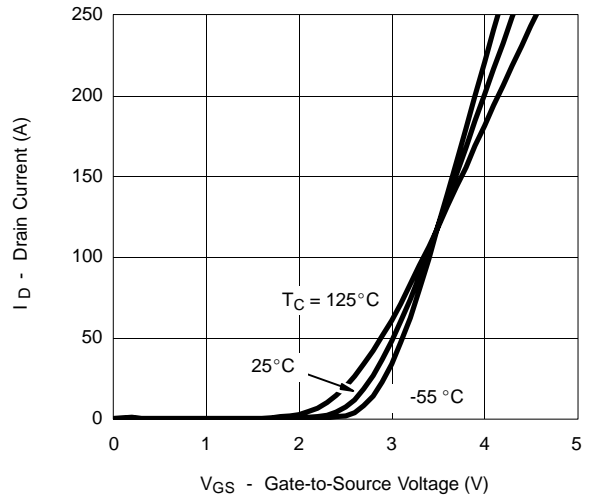


TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

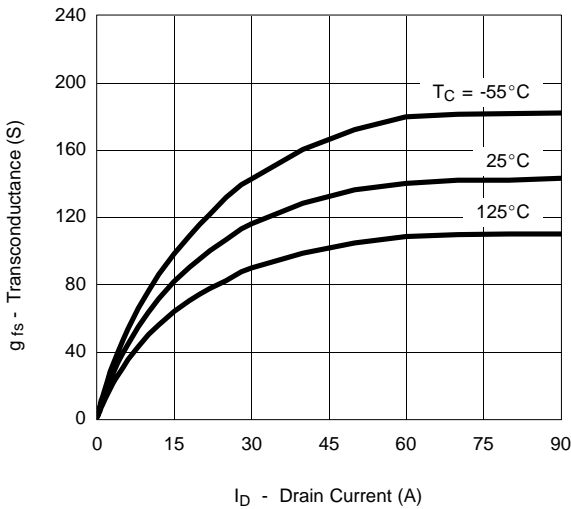
Output Characteristics



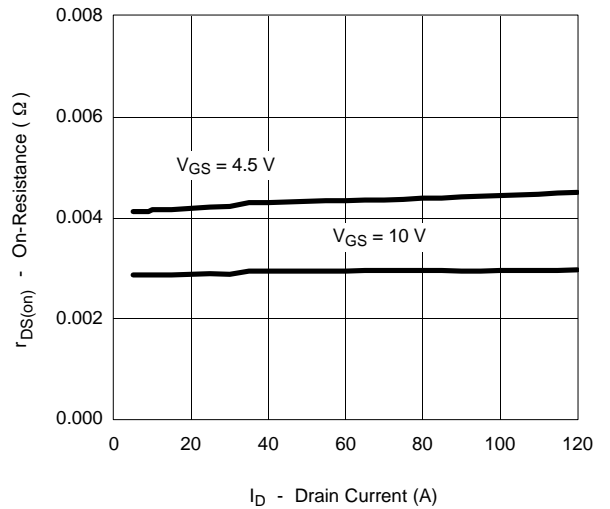
Transfer Characteristics



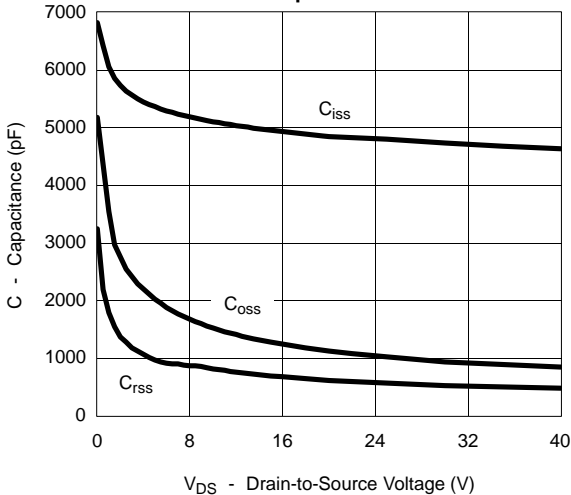
Transconductance



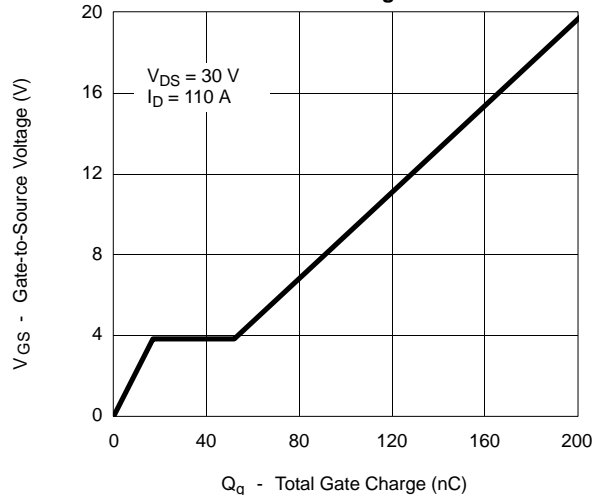
On-Resistance vs. Drain Current



Capacitance

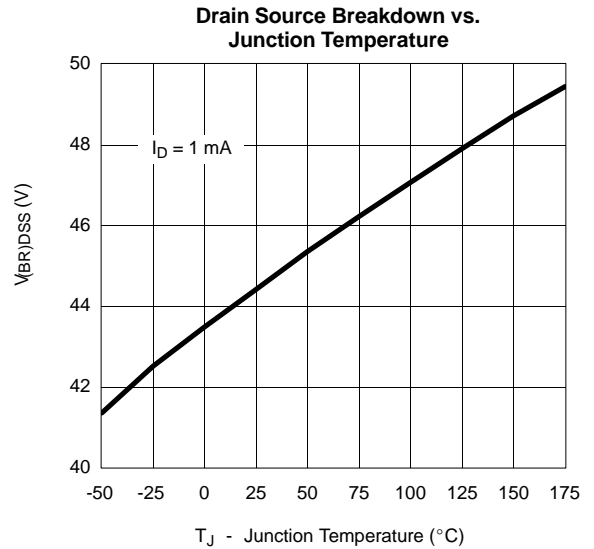
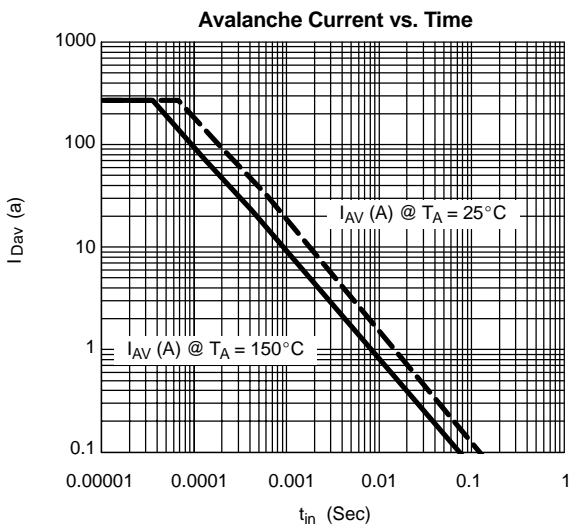
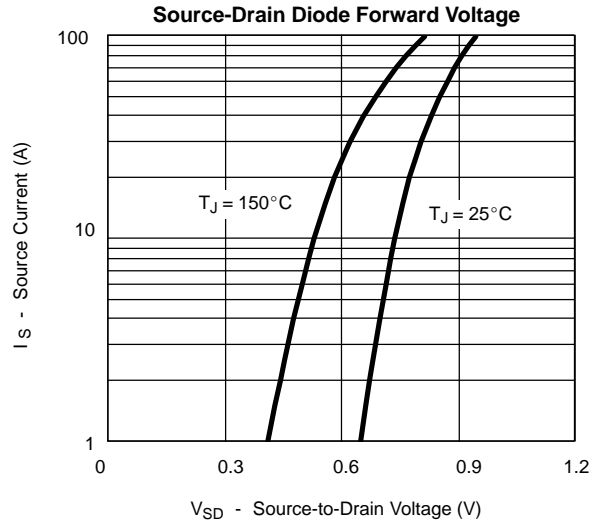
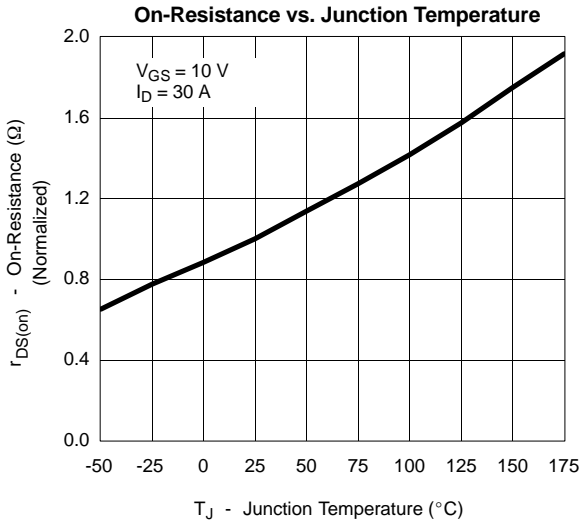


Gate Charge





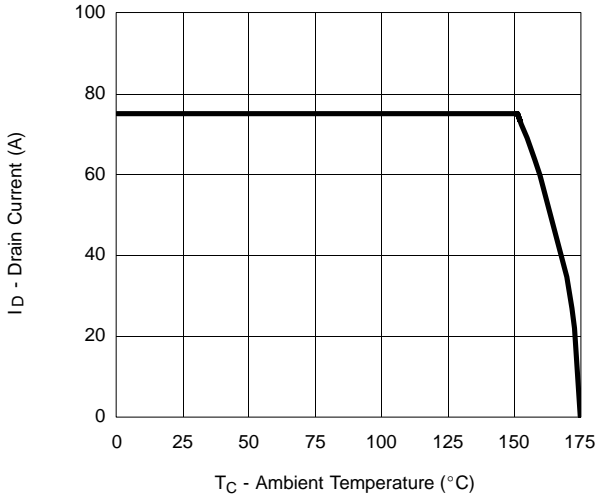
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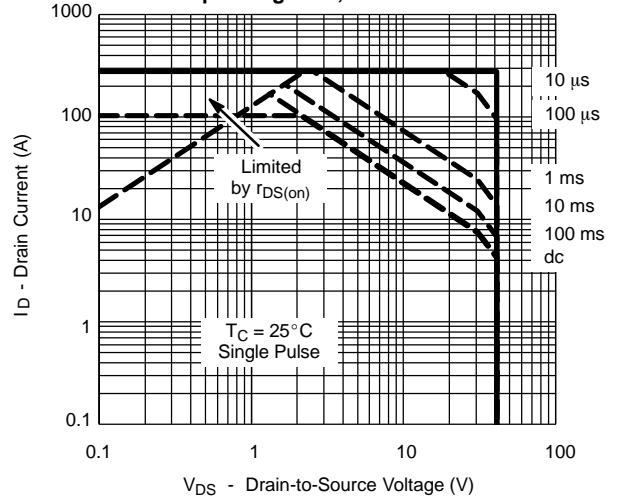


THERMAL RATINGS

Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Case

