

70N10L-VB TO220 Datasheet

N-Channel 100-V (D-S) 175 °C MOSFET

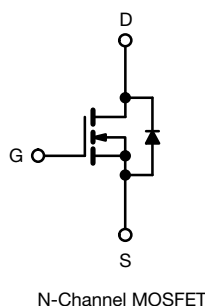
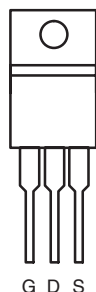
PRODUCT SUMMARY	
V_{DS} (V)	100
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.009
$R_{DS(on)}$ (Ω) at $V_{GS} = 4.5$ V	0.020
I_D (A)	100
Configuration	Single

FEATURES

- TrenchFET® Power MOSFET
- 175 °C Maximum Junction Temperature
- Compliant to RoHS Directive 2002/95/EC


RoHS
 COMPLIANT

TO-220AB



ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V _{DS}	100	V
Gate-Source Voltage		V _{GS}	± 20	
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	100	A
	T _C = 125 °C		75 ^a	
Pulsed Drain Current		I _{DM}	300	
Avalanche Current	L = 0.1 mH	I _{AS}	75	
Single Pulse Avalanche Energy ^b		E _{AS}	280	mJ
Maximum Power Dissipation ^b	T _C = 25 °C (TO-220AB and TO-263)	P _D	250 ^c	W
	T _A = 25 °C (TO-263) ^d		3.75	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS				
Parameter		Symbol	Limit	Unit
Junction-to-Ambient	PCB Mount (TO-263) ^d	R _{thJA}	40	°C/W
	Free Air (TO-220AB)		62.5	
Junction-to-Case		R _{thJC}	0.6	

Notes:

- a. Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- b. Guaranteed by design, not subject to production testing.
- c. 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.

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	100			V
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2		4	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 100 V, V _{GS} = 0 V			1	μA
		V _{DS} = 100 V, V _{GS} = 0 V, T _J = 125 °C			50	
		V _{DS} = 100 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		0.009		Ω
		V _{GS} = 4.5 V, I _D = 20 A		0.020		
		V _{GS} = 10 V, I _D = 30 A, T _J = 125 °C		0.023		
		V _{GS} = 10 V, I _D = 30 A, T _J = 175 °C		0.030		
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 30 A	25			S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		4700		pF
Output Capacitance	C _{oss}			665		
Reverse Transfer Capacitance	C _{rss}			265		
Total Gate Charge ^c	Q _g	V _{DS} = 50 V, V _{GS} = 10 V, I _D = 85 A		105	160	nC
Gate-Source Charge ^c	Q _{gs}			17		
Gate-Drain Charge ^c	Q _{gd}			23		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 50 V, R _L = 0.6 Ω I _D ≅ 85 A, V _{GEN} = 10 V, R _g = 2.5 Ω		12	25	ns
Rise Time ^c	t _r			90	135	
Turn-Off DelayTime ^c	t _{d(off)}			55	85	
Fall Time ^c	t _f			130	195	
Source-Drain Diode Ratings and Characteristics T _C = 25 °C ^b						
Continuous Current	I _S				85	A
Pulsed Current	I _{SM}				240	
Forward Voltage ^a	V _{SD}	I _F = 85 A, V _{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 50 A, dI/dt = 100 A/μs		85	140	ns
Peak Reverse Recovery Current	I _{RM(REC)}			4.5	7	A
Reverse Recovery Charge	Q _{rr}			0.17	0.35	μC

Notes:

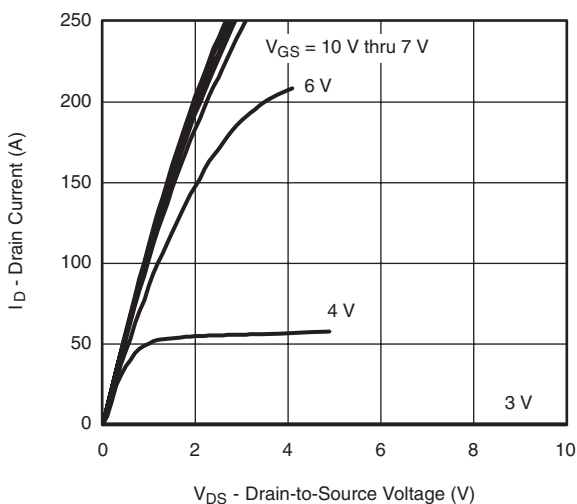
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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

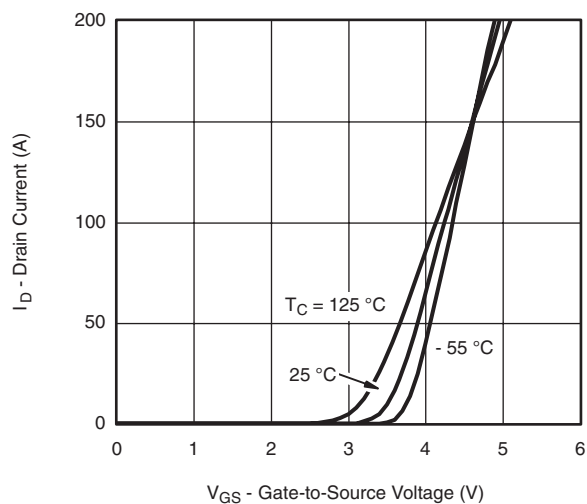
c. Independent of operating temperature.

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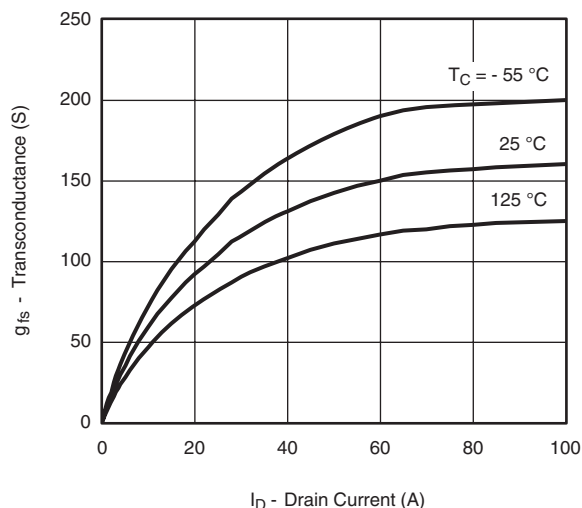
TYPICAL CHARACTERISTICS $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted



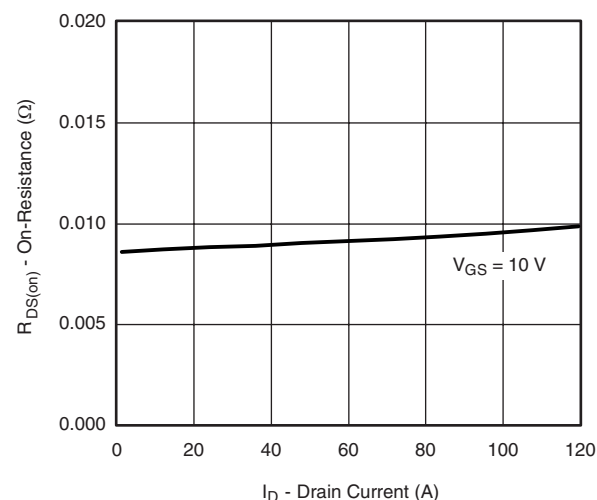
Output Characteristics



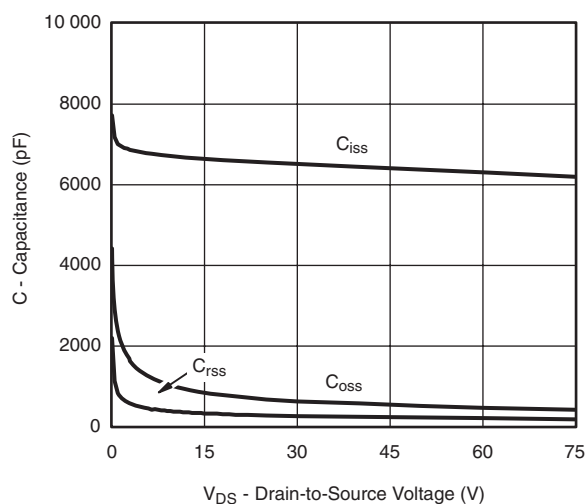
Transfer Characteristics



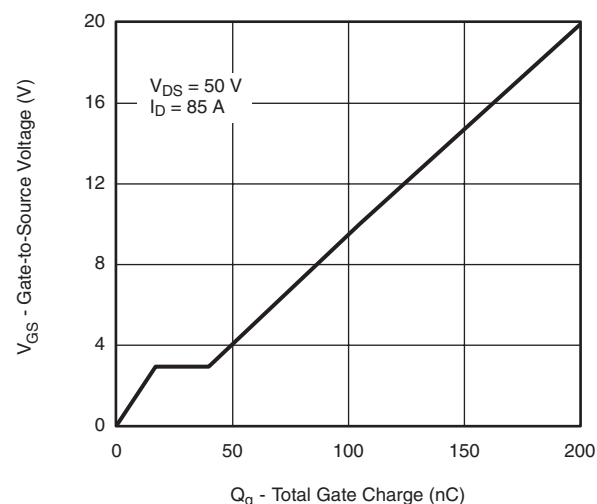
Transconductance



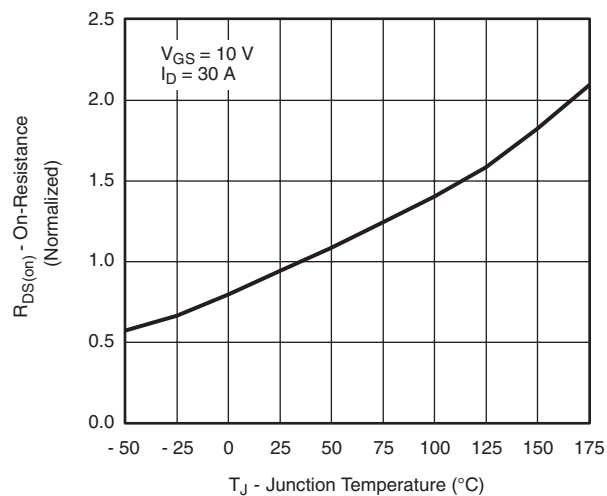
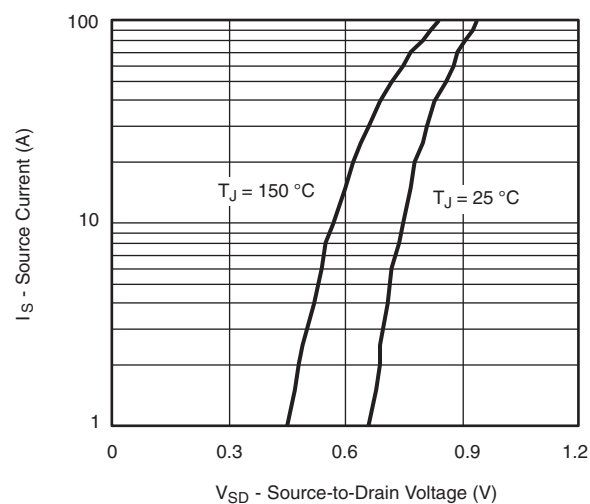
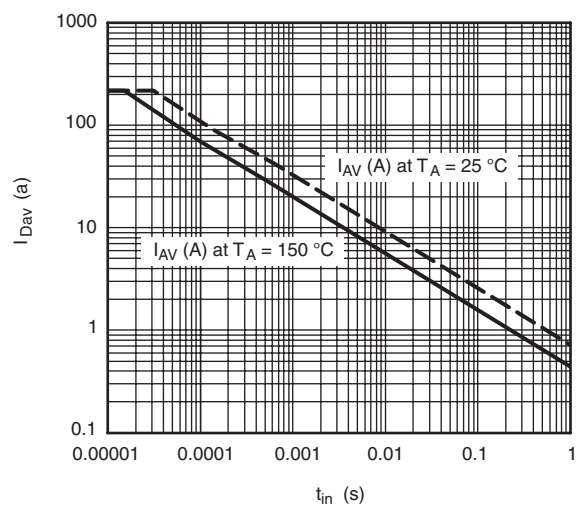
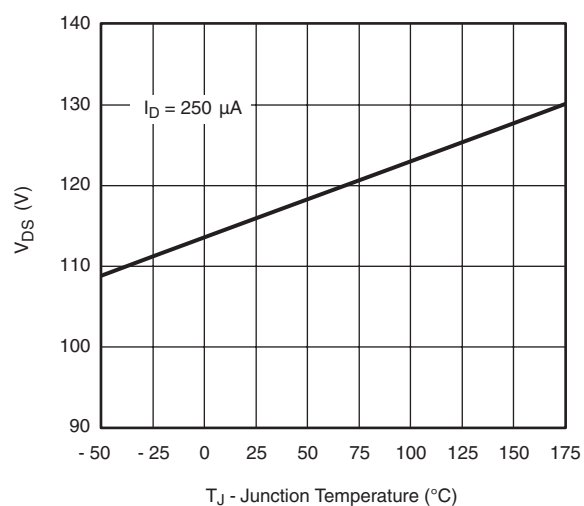
On-Resistance vs. Drain Current



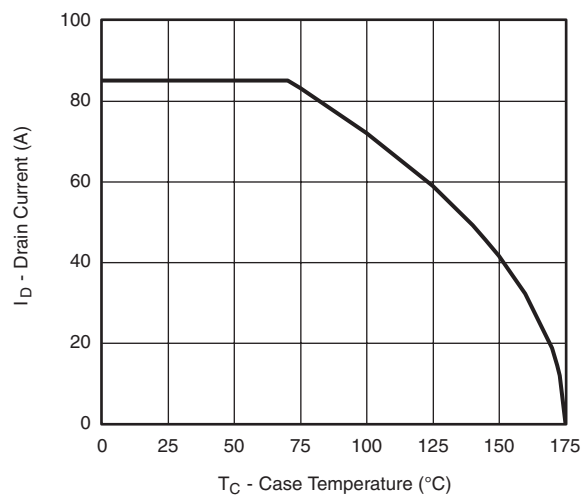
Capacitance



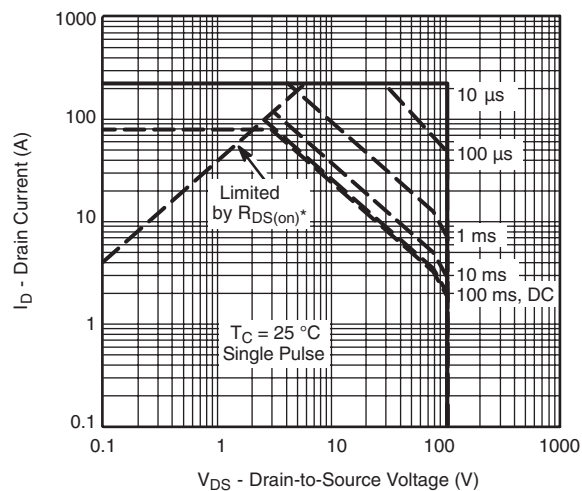
Gate Charge

TYPICAL CHARACTERISTICS $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted

On-Resistance vs. Junction Temperature

Source-Drain Diode Forward Voltage

Avalanche Current vs. Time

 T_J - Drain-Source Breakdown vs. Junction-Temperature

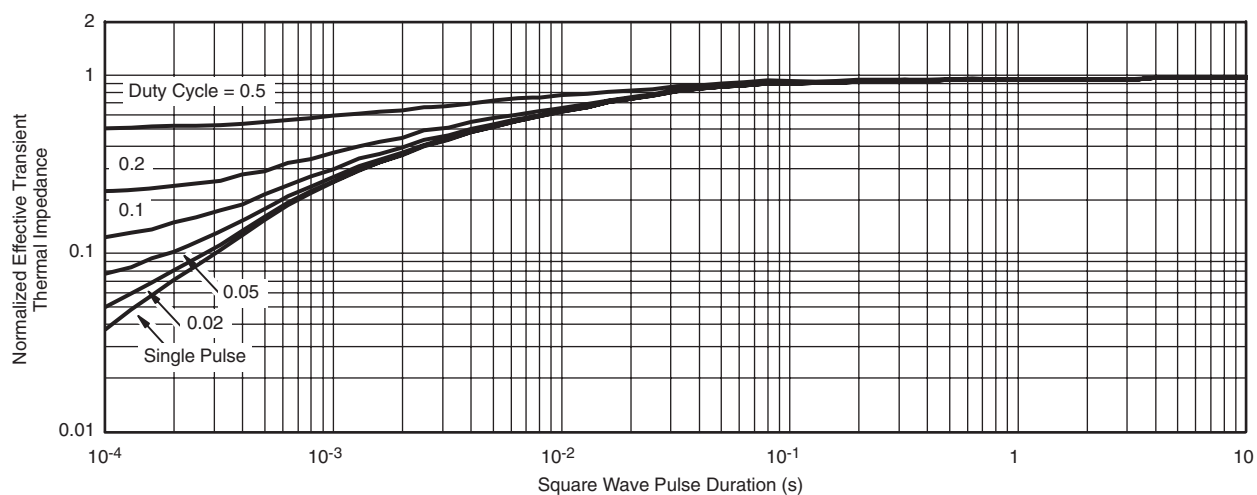
THERMAL RATINGS



**Maximum Avalanche and Drain Current
vs. Case Temperature**

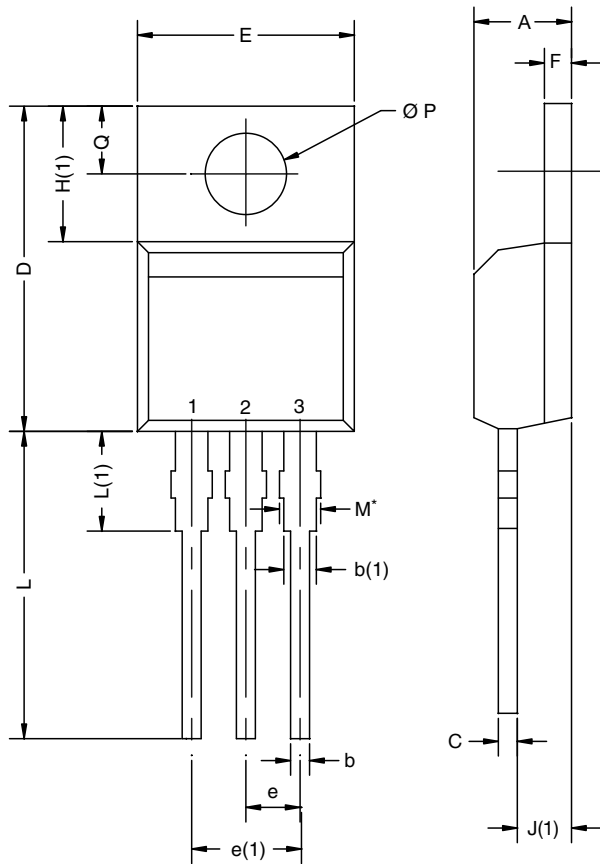


Safe Operating Area
 * $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



Normalized Thermal Transient Impedance, Junction-to-Case

TO-220AB



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
D2	12.19	12.70	0.480	0.500
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: T14-0413-Rev. P, 16-Jun-14
DWG: 5471

Note

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM

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