

## RU190N10Q-VB Datasheet

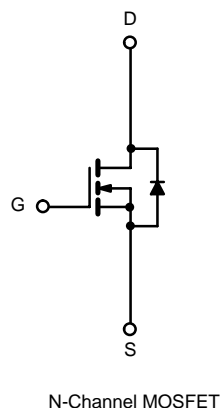
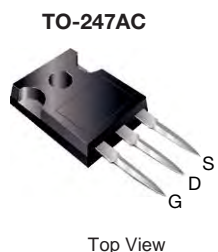
### N-Channel 100 V (D-S) 175 °C MOSFET

#### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
100	0.006 at $V_{GS} = 10$ V	150

#### FEATURES

- Trench Power MOSFET
- New Package with Low Thermal Resistance
- 100 %  $R_g$  Tested



#### ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C)	$I_D$	150	A
		100 <sup>a</sup>	
Pulsed Drain Current	$I_{DM}$	600	
Avalanche Current	$I_{AR}$	75	
Repetitive Avalanche Energy <sup>b</sup>	$E_{AR}$	280	mJ
Maximum Power Dissipation <sup>b</sup>	$P_D$	375 <sup>c</sup>	W
		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	$R_{thJA}$	40	°C/W
Junction-to-Case (Drain)	$R_{thJC}$	0.5	

Notes:

a. Package limited.

b. Duty cycle  $\leq 1$  %.

c. See SOA curve for voltage derating.

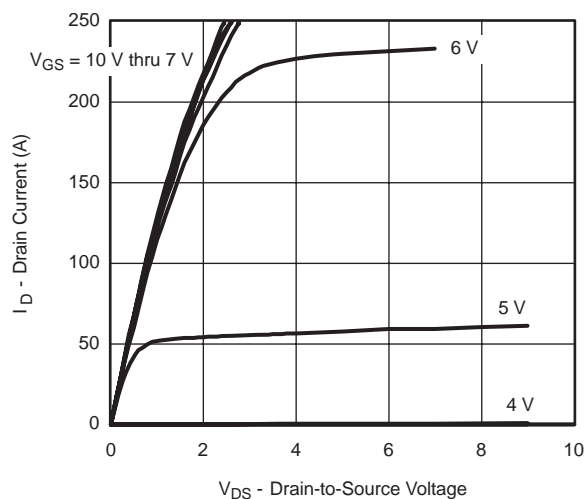
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2		4	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$			50	
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^{\circ}\text{C}$			250	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	120			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$		0.006		$\Omega$
		$V_{GS} = 10\text{ V}, I_D = 30\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$		0.017		
		$V_{GS} = 10\text{ V}, I_D = 30\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$		0.025		
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 30\text{ A}$	25			S
Dynamic <sup>b</sup>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		6700		pF
Output Capacitance	$C_{oss}$			750		
Reverse Transfer Capacitance	$C_{rss}$			280		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 85\text{ A}$		110	160	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			24		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			24		
Gate Resistance	$R_g$		1.0		6.2	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \cong 85\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		20	30	ns
Rise Time <sup>c</sup>	$t_r$			125	200	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			55	85	
Fall Time <sup>c</sup>	$t_f$			130	195	
Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^{\circ}\text{C}^b$						
Continuous Current	$I_S$				110	A
Pulsed Current	$I_{SM}$				240	
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = 85\text{ A}, V_{GS} = 0\text{ V}$		1.0	1.5	V
Reverse Recovery Time	$t_{rr}$	$I_F = 50\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		70	140	ns
Peak Reverse Recovery Charge	$I_{RM(REC)}$			5.5	10	A
Reverse Recovery Charge	$Q_{rr}$			0.19	0.35	$\mu\text{C}$

Notes:

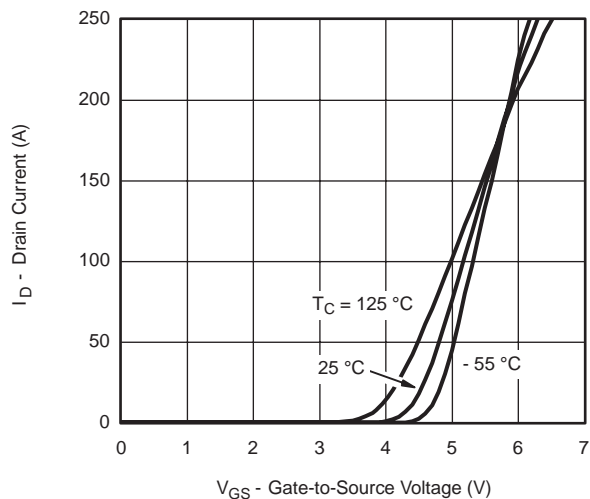
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.  
 c. Independent of operating temperature.

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.

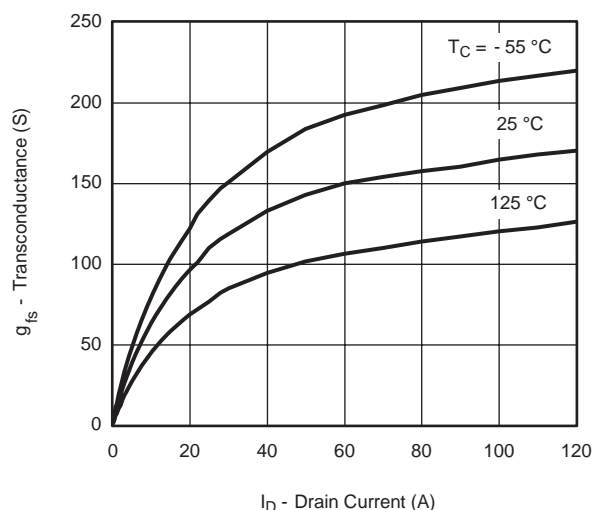
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



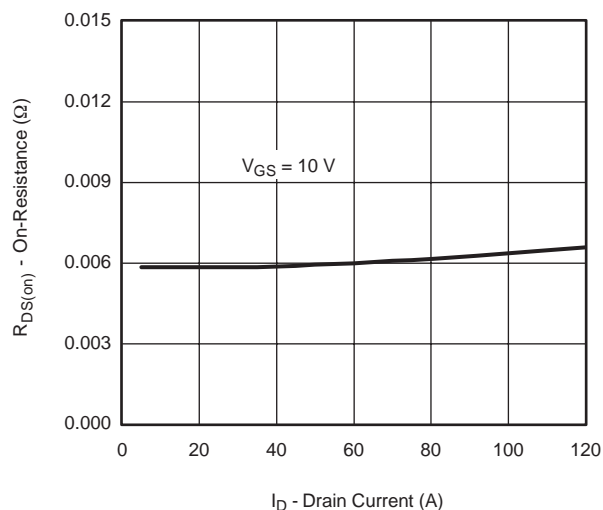
Output Characteristics



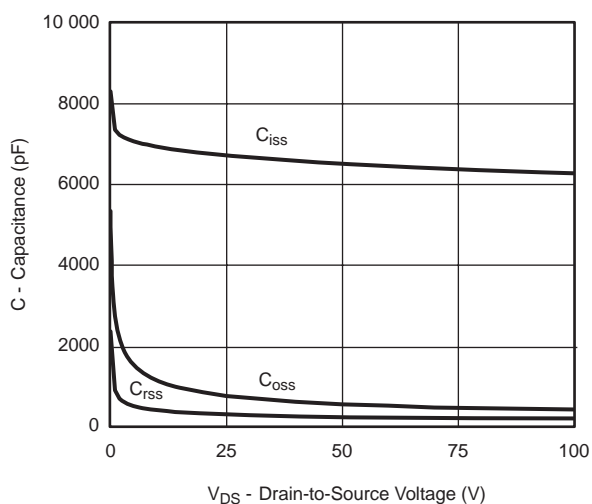
Transfer Characteristics



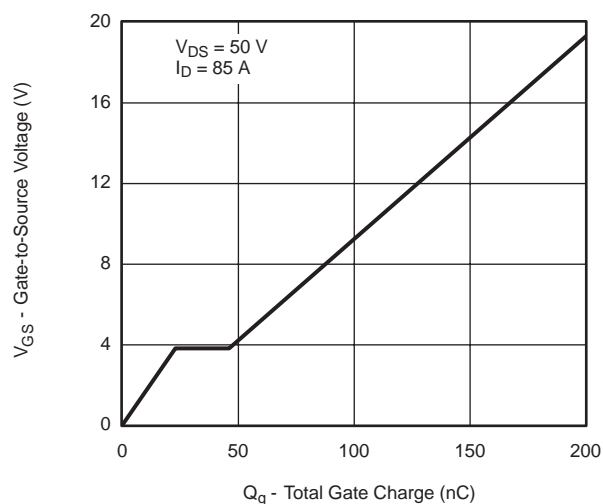
Transconductance



On-Resistance vs. Drain Current

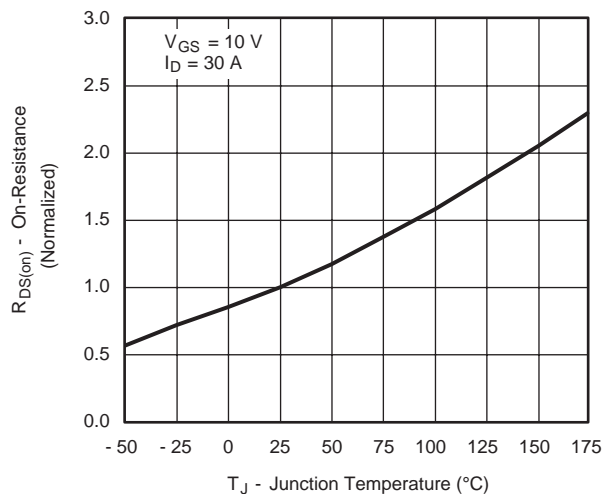


Capacitance

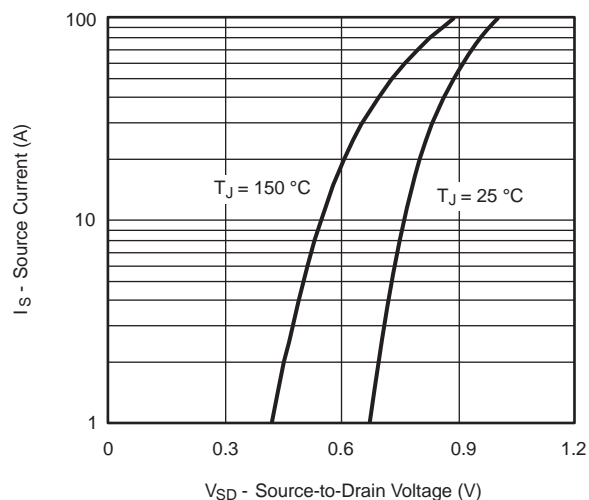


Gate Charge

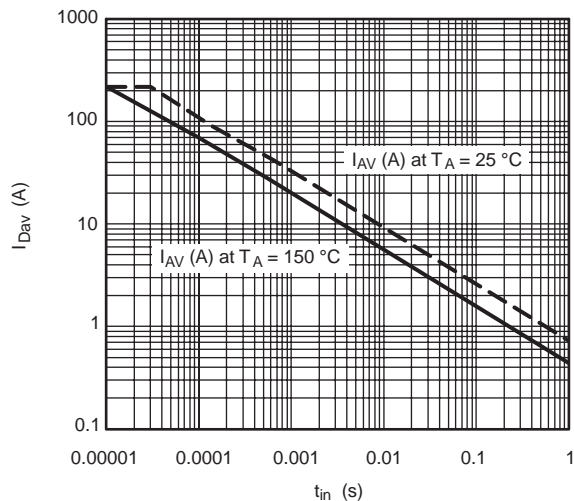
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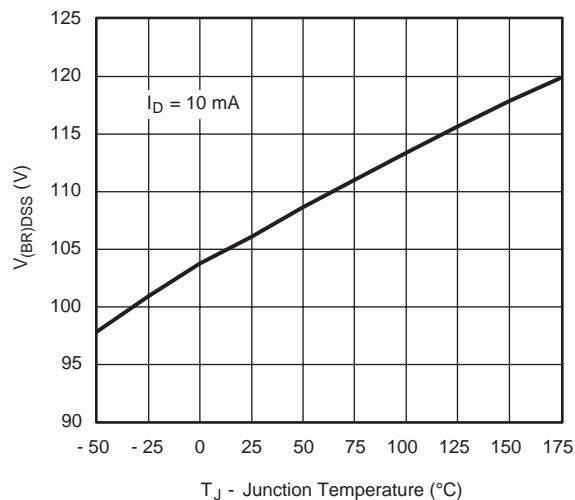
**On-Resistance vs. Junction Temperature**



**Source-Drain Diode Forward Voltage**

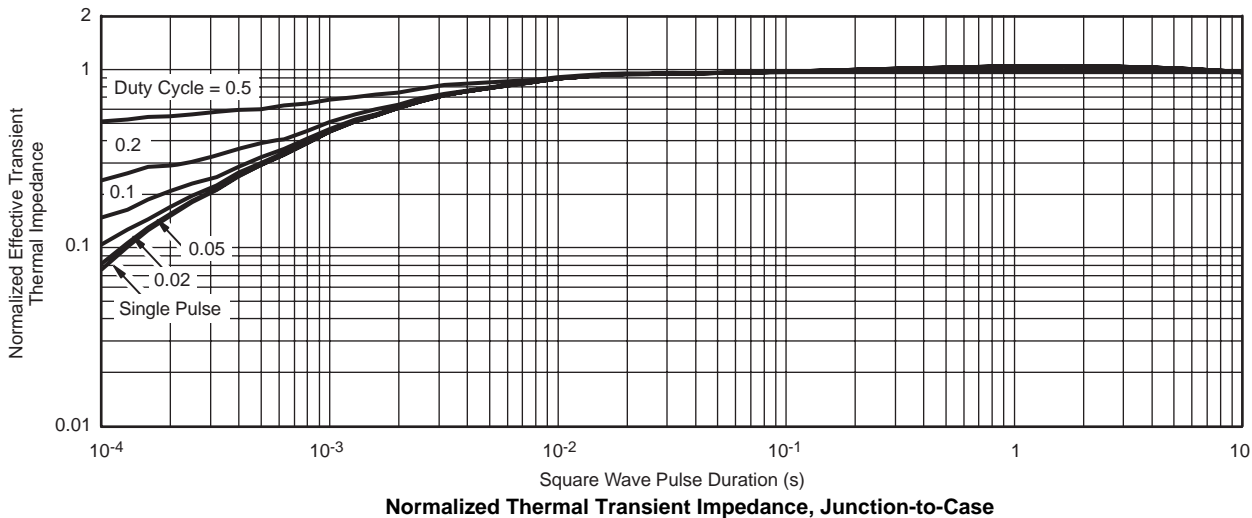
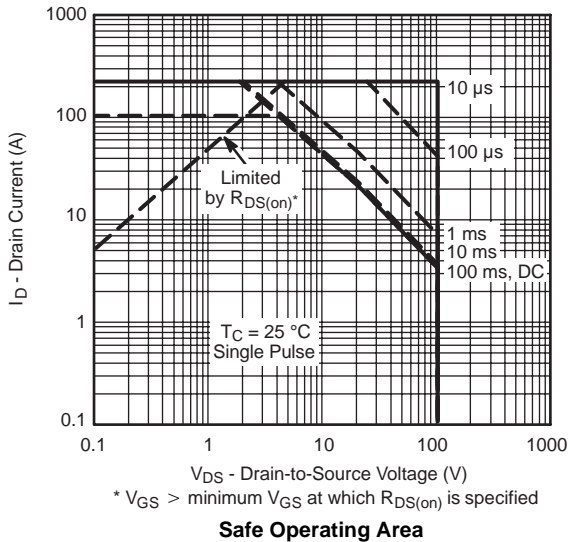


**Avalanche Current vs. Time**

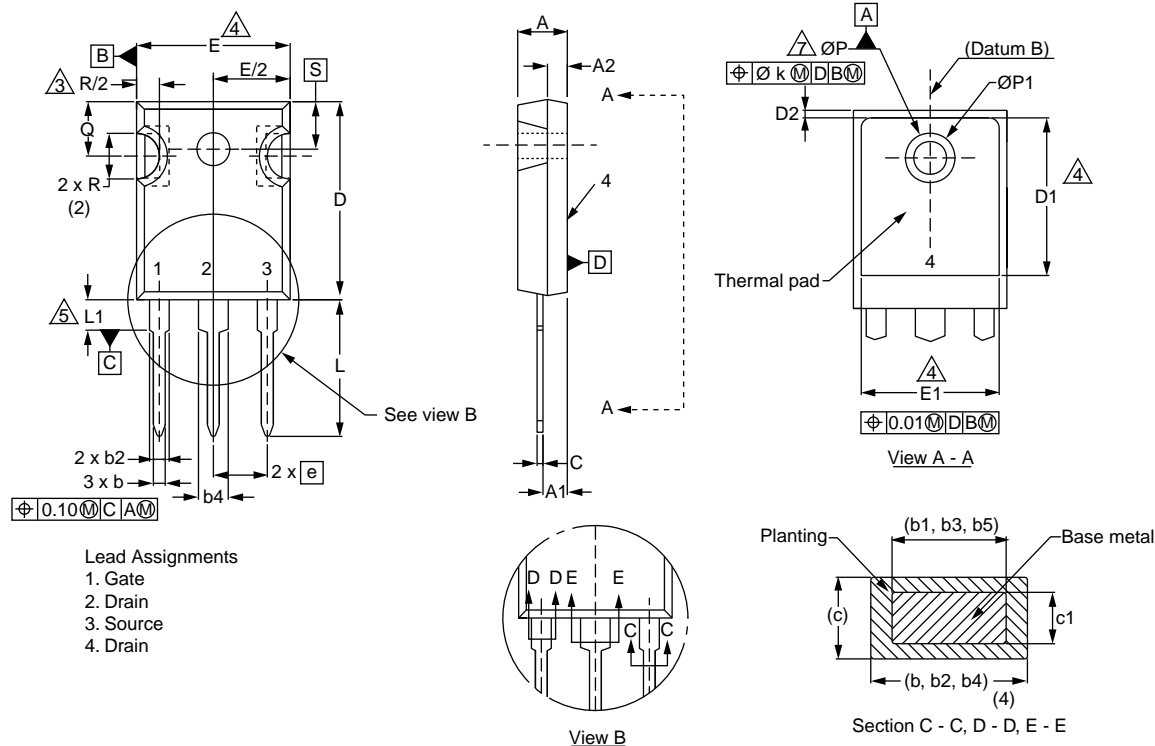


**Drain Source Breakdown vs. Junction Temperature**

**THERMAL RATINGS**



TO-247AC



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.58	5.31	0.180	0.209
A1	2.21	2.59	0.087	0.102
A2	1.17	2.49	0.046	0.098
b	0.99	1.40	0.039	0.055
b1	0.99	1.35	0.039	0.053
b2	1.53	2.39	0.060	0.094
b3	1.65	2.37	0.065	0.093
b4	2.42	3.43	0.095	0.135
b5	2.59	3.38	0.102	0.133
c	0.38	0.86	0.015	0.034
c1	0.38	0.76	0.015	0.030
D	19.71	20.82	0.776	0.820
D1	13.08	-	0.515	-

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D2	0.51	1.30	0.020	0.051
E	15.29	15.87	0.602	0.625
E1	13.72	-	0.540	-
e	5.46 BSC		0.215 BSC	
Ø k	0.254		0.010	
L	14.20	16.25	0.559	0.640
L1	3.71	4.29	0.146	0.169
N	7.62 BSC		0.300 BSC	
Ø P	3.51	3.66	0.138	0.144
Ø P1	-	7.39	-	0.291
Q	5.31	5.69	0.209	0.224
R	4.52	5.49	0.178	0.216
S	5.51 BSC		0.217 BSC	

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