

RU60P60R-VB Datasheet

P-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY		
V_{DS}	-60	V
$R_{DS(on)} V_{GS} = 10\text{ V}$	19	$m\Omega$
$R_{DS(on)} V_{GS} = 4.5\text{ V}$	26	$m\Omega$
I_D	-50	A
Configuration	Single	

FEATURES

- Trench Power MOSFET
- 100 % UIS Tested

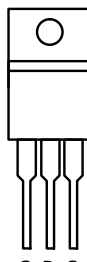
APPLICATIONS

- Load Switch

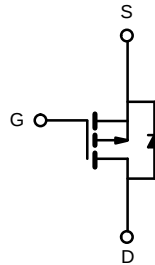


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TO-220AB



Top View



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$)	I_D	$T_C = 25\text{ }^{\circ}\text{C}$	A
		$T_C = 70\text{ }^{\circ}\text{C}$	
		$T_A = 25\text{ }^{\circ}\text{C}$	
		$T_A = 70\text{ }^{\circ}\text{C}$	
Pulsed Drain Current	I_{DM}	- 200	A
Avalanche Current Pulse	I_{AS}	- 45	
Single Pulse Avalanche Energy	E_{AS}	101	mJ
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$	A
		$T_A = 25\text{ }^{\circ}\text{C}$	
Maximum Power Dissipation	P_D	$T_C = 25\text{ }^{\circ}\text{C}$	W
		$T_C = 70\text{ }^{\circ}\text{C}$	
		$T_A = 25\text{ }^{\circ}\text{C}$	
		$T_A = 70\text{ }^{\circ}\text{C}$	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^{\circ}\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^b	R_{thJA}	33	40	$^{\circ}\text{C/W}$
Maximum Junction-to-Case	R_{thJC}	0.98	1.2	

Notes:

a. Based on $T_C = 25\text{ }^{\circ}\text{C}$.

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

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	- 60			V	
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		68		mV/°C	
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 5.2			
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} = - 60 V, V _{GS} = 0 V			- 1	μA	
		V _{DS} = - 60 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	- 120			A	
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 30 A		19		mΩ	
		V _{GS} = - 4.5 V, I _D = - 20 A		26			
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 50 A	20			S	
Dynamic ^b							
Input Capacitance	C _{iss}	V _{DS} = - 25 V, V _{GS} = 0 V, f = 1 MHz		3700		pF	
Output Capacitance	C _{oss}			390			
Reverse Transfer Capacitance	C _{rss}			290			
Total Gate Charge	Q _g	V _{DS} = - 30 V, V _{GS} = - 10 V, I _D = - 55 A		76	115	nC	
Gate-Source Charge	Q _{gs}	V _{DS} = - 30 V, V _{GS} = - 4.5 V, I _D = - 55 A		38	60		
Gate-Drain Charge	Q _{gd}			16			
Gate Resistance	R _g			19			
Turn-On Delay Time	t _{d(on)}	f = 1 MHz		5.2		Ω	
Rise Time	t _r		V _{DD} = - 2 V, R _L = 2 Ω I _D ≡ - 10 A, V _{GEN} = - 10 V, R _g = 1 Ω		10	15	ns
Turn-Off Delay Time	t _{d(off)}				7	15	
Fall Time	t _f				70	110	
				40	60		
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 69	A	
Pulse Diode Forward Current ^a	I _{SM}				- 150		
Body Diode Voltage	V _{SD}	I _S = - 30 A		- 1	- 1.5	V	
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 50 A, di/dt = 100 A/μs, T _J = 25 °C		45	68	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			59	120	nC	
Reverse Recovery Fall Time	t _a			29		ns	
Reverse Recovery Rise Time	t _b			16			

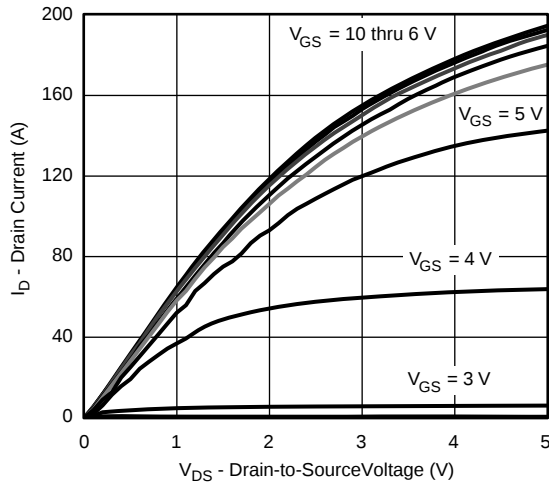
Notes:

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

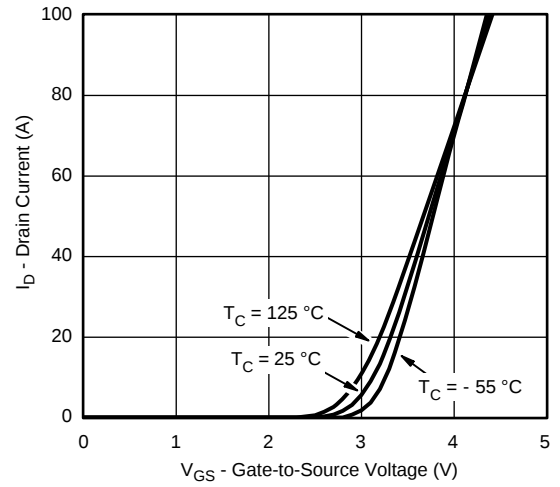
b. Guaranteed by design, not subject to production testing.

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.

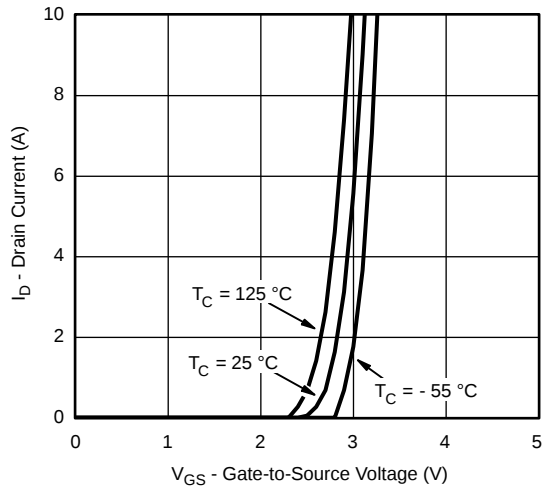
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Output Characteristics



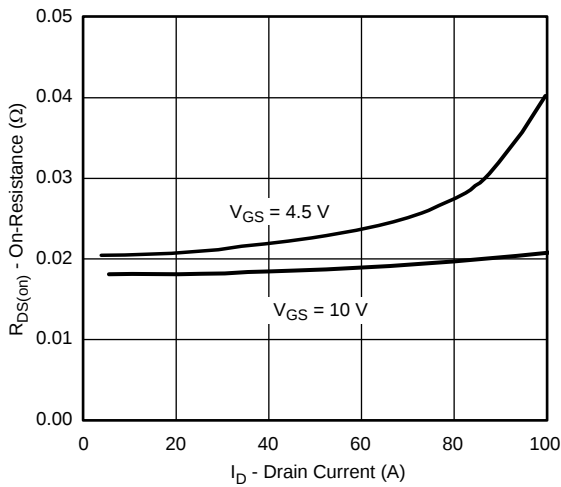
Transfer Characteristics



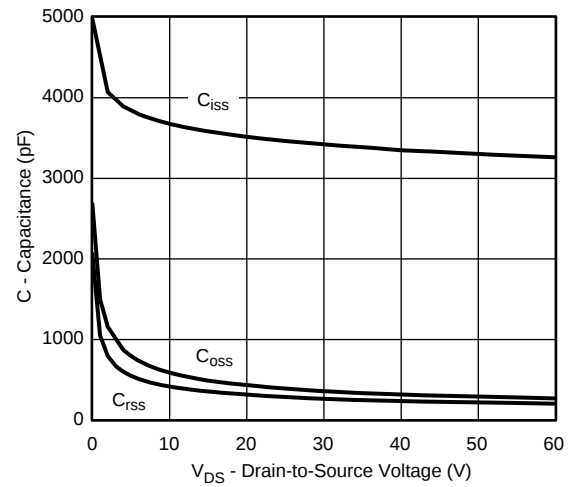
Transfer Characteristics



Transconductance

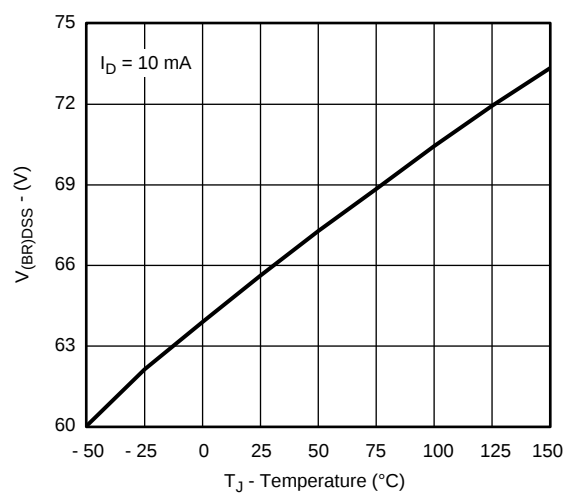
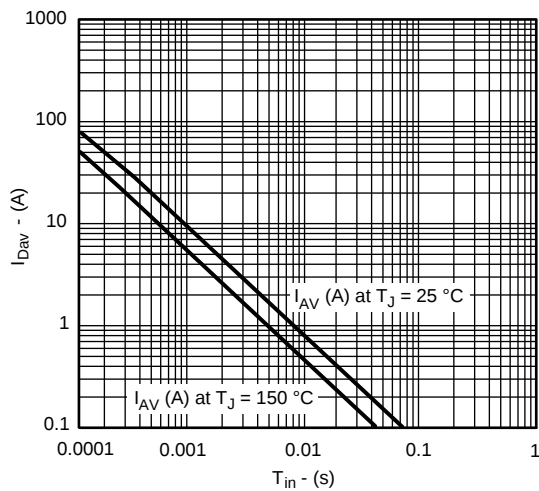
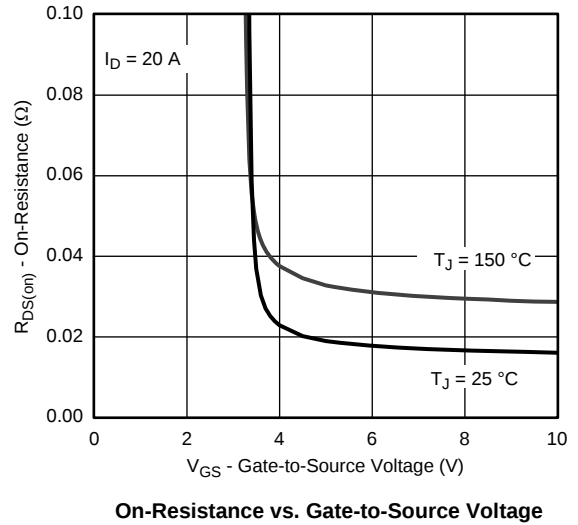
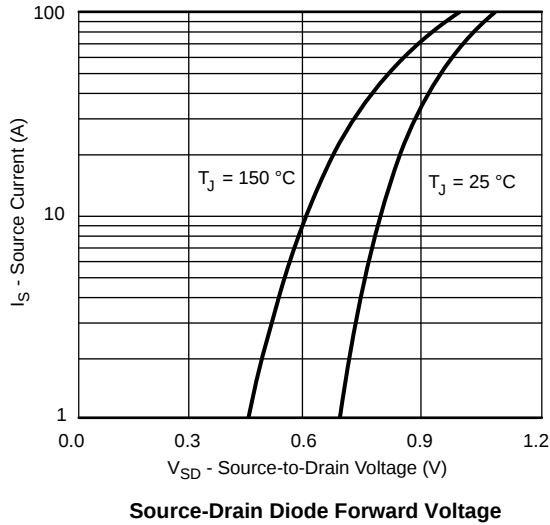
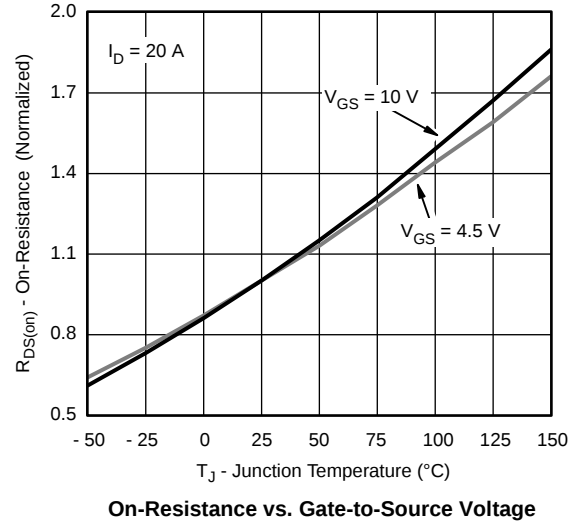
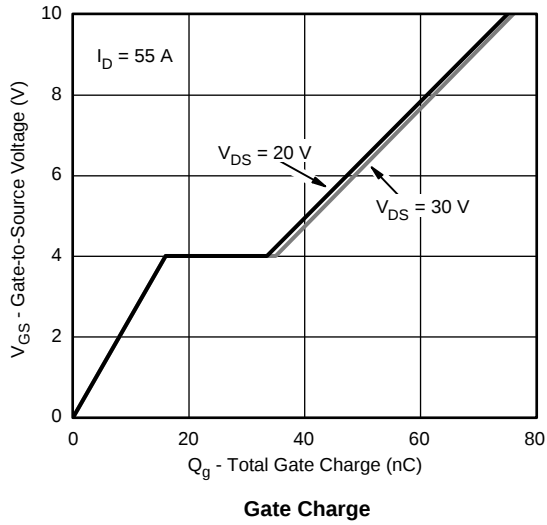


On-Resistance vs. Drain Current



Capacitance

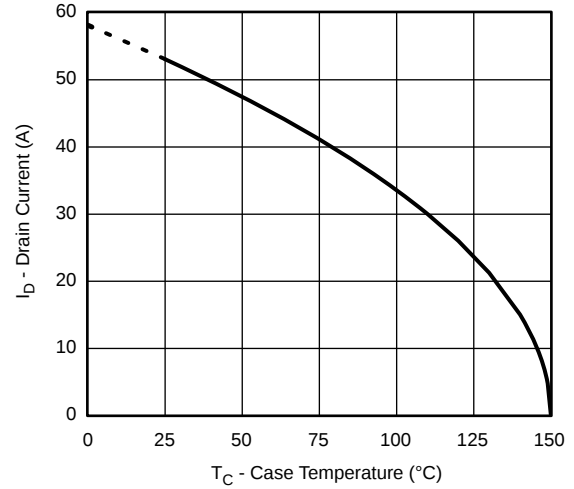
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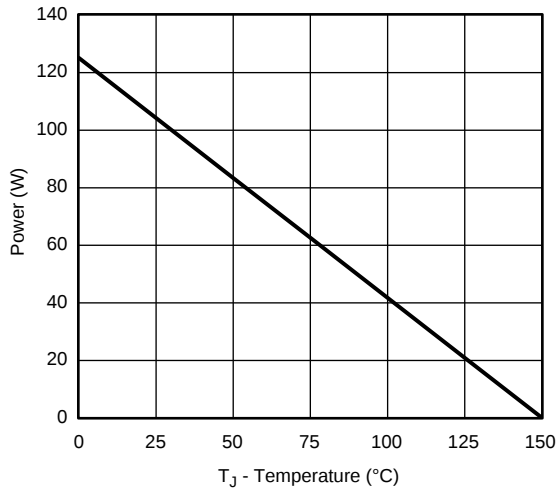
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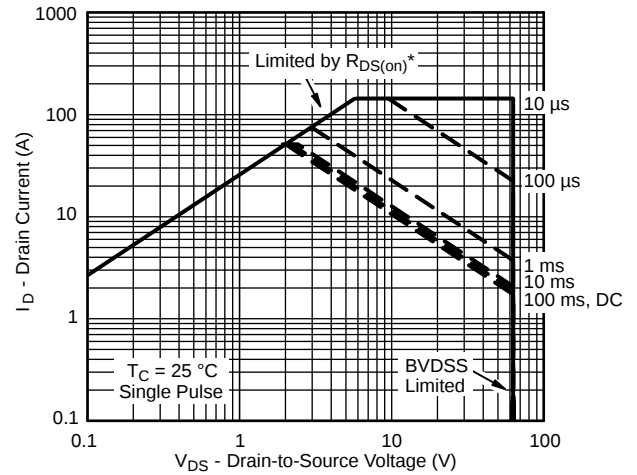
Threshold Voltage



Max. Drain Current vs. Case Temperature

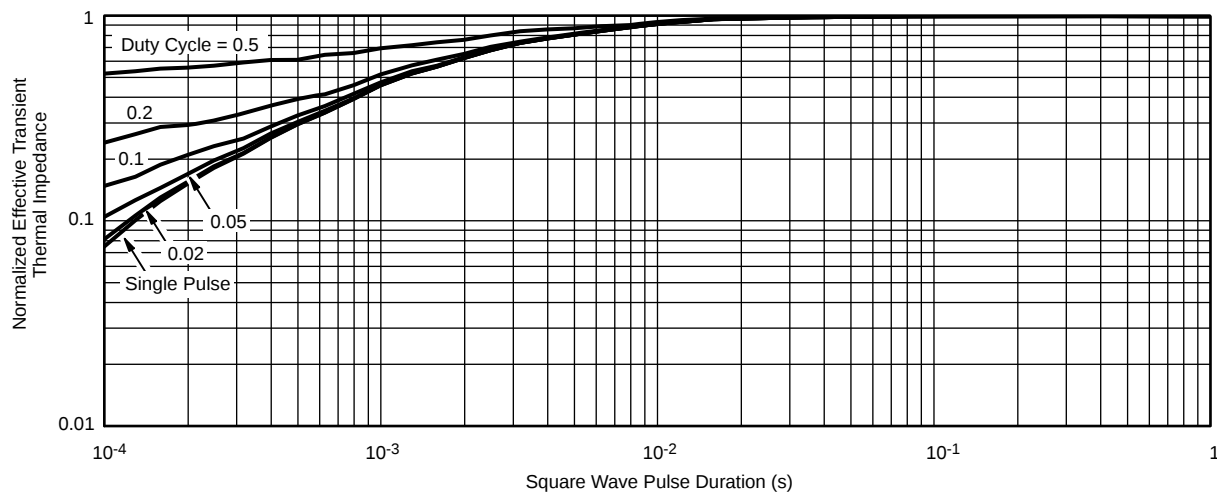


Power Derating, Junction-to-Case



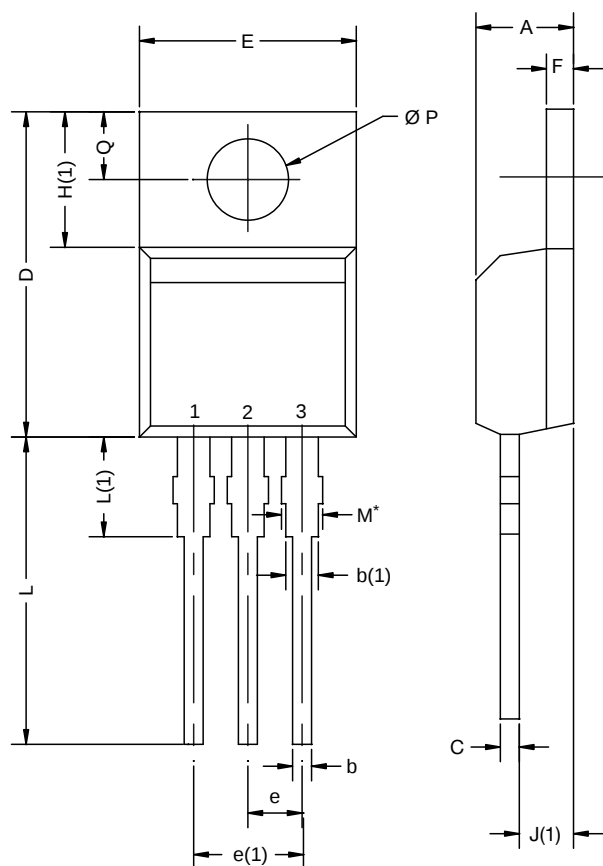
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Case

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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
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: X12-0208-Rev. N, 08-Oct-12
DWG: 5471

Notes

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

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