

HAT2019R-VB Datasheet

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

PRODUCT SUMMARY						
V _{DS} (V)	$R_{DS(on)}(\Omega)$	I _D (A) ^a	Q _g (Typ.)			
30	0.008 at V _{GS} = 10 V	13	6.1 nC			
	0.011 at V _{GS} = 4.5 V	11	0.1110			

SO-8

Top View

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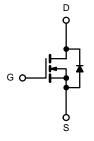
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FEATURES

- · Halogen-free
- Trench Power MOSFET
- Optimized for High-Side Synchronous Rectifier Operation
- 100 % R_g Tested
- 100 % UIS Tested

APPLICATIONS

- · Notebook CPU Core
 - High-Side Switch



N-Channel MOSFET

Parameter		Symbol	Limit	Unit	
Drain-Source Voltage	V _{DS}	30	V		
Gate-Source Voltage	V _{GS}	± 20	v		
	T _C = 25 °C		13		
Continuous Drain Current (T _{.1} = 150 °C)	T _C = 70 °C	1	10	7	
Continuous Dialii Curient (1) = 130 C)	T _A = 25 °C	I _D	9 ^{b, c}		
	T _A = 70 °C		7 ^{b, c}	^	
Pulsed Drain Current	I _{DM}	45	A		
Continuous Source Drain Diede Current	T _C = 25 °C	1.	3.7		
Continuous Source-Drain Diode Current	T _A = 25 °C	I _S	2.0 ^{b, c}		
Single Pulse Avalanche Current	L = 0.1 mH	I _{AS}	20		
Avalanche Energy	L=0.11IIII	E _{AS}	21	mJ	
	T _C = 25 °C		4.1		
Maximum Dawar Dissination	T _C = 70 °C	P _D	2.5	\Box w	
Maximum Power Dissipation	T _A = 25 °C	LD	2.2 ^{b, c}	VV	
	T _A = 70 °C		1.3 ^{b, c}		
Operating Junction and Storage Temperature Ra	T _J , T _{stg}	- 55 to 150	°C		

THERMAL RESISTANCE RATINGS							
Parameter		Symbol	Typical	Maximum	Unit		
Maximum Junction-to-Ambient ^{b, d}	t ≤ 10 s	R_{thJA}	39	55	°C/W		
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	25	29	C/VV		

Notes:

- a. Base on $T_C = 25$ °C.
- b. Surface Mounted on 1" x 1" FR4 board.
- c. t = 10 s.
- d. Maximum under Steady State conditions is 85 °C/W.



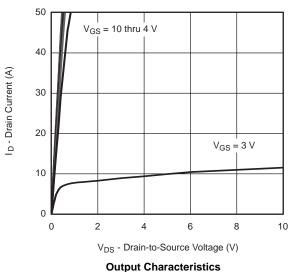
SPECIFICATIONS $T_J = 25 ^{\circ}\text{C}$ Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static				.,,,,			
Drain-Source Breakdown Voltage	V _{DS}	$V_{GS} = 0 \text{ V}, I_{D} = 250 \mu\text{A}$	30			V	
V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_{J}$			26		mV/°C	
V _{GS(th)} Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I _D = 250 μA		- 6			
Gate-Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_{D} = 250 \mu\text{A}$	1.0		3.0	V	
Gate-Source Leakage	I _{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA	
		V _{DS} = 30 V, V _{GS} = 0 V			1		
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C			10	μΑ	
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$	20			Α	
		V _{GS} = 10 V, I _D = 10 A	0.008			+	
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 9 A				Ω	
Forward Transconductance ^a	9 _{fs}	V _{DS} = 15 V, I _D = 10 A		50		S	
Dynamic ^b				L		ı	
Input Capacitance	C _{iss}			800		pF	
Output Capacitance	C _{oss}	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		165			
Reverse Transfer Capacitance	C _{rss}			73			
Total Cata Charma	Qg	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 10 A		15	23		
Total Gate Charge				6.8	10.2	nC	
Gate-Source Charge	Q_{gs}	$V_{DS} = 15 \text{ V}, V_{GS} = 5 \text{ V}, I_{D} = 10 \text{ A}$		2.5			
Gate-Drain Charge	Q_{gd}			2.3			
Gate Resistance	R_g	f = 1 MHz	0.36	1.8	3.6	Ω	
Turn-On Delay Time	t _{d(on)}			16	23		
Rise Time	t _r	V_{DD} = 15 V, R_L = 1.4 Ω		12	16		
Turn-Off Delay Time	t _{d(off)}	$I_D \cong 9 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_g = 1 \Omega$		16	22		
Fall Time	t _f			10	18]	
Turn-On Delay Time	t _{d(on)}			8	16	ns	
Rise Time	t _r	V_{DD} = 15 V, R_L = 1.4 Ω		10	20		
Turn-Off Delay Time	t _{d(off)}	$I_D \cong 9 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 1 \Omega$		16	22		
Fall Time	t _f			8	15		
Drain-Source Body Diode Characterist	ics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			10		
Pulse Diode Forward Current ^a	I _{SM}				50	A	
Body Diode Voltage	V_{SD}	I _S = 9 A		0.8	1.2	V	
Body Diode Reverse Recovery Time	t _{rr}			15	30	ns	
Body Diode Reverse Recovery Charge	Q _{rr}	I _F = 9 A, dI/dt = 100 A/μs, T _{.I} = 25 °C		6	12	nC	
Reverse Recovery Fall Time	t _a	i _F = θ A, αί/αι = 100 A/μs, 1 _J = 25 °C		8		200	
Reverse Recovery Rise Time	t _b			7		ns	

Notes:

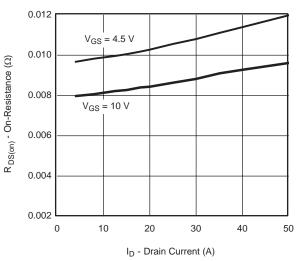
- a. Pulse test; pulse width $\leq 300~\mu s,$ duty cycle $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.

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.

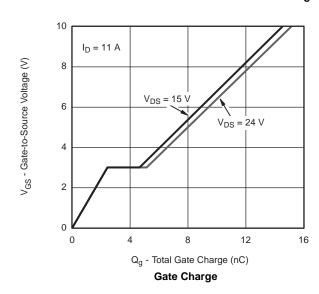






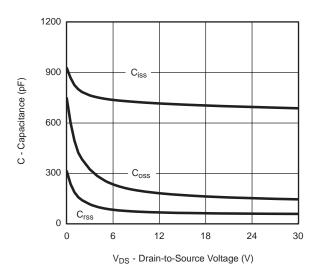


On-Resistance vs. Drain Current and Gate Voltage

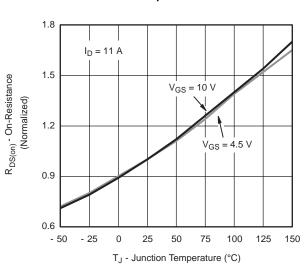


5 $T_{C} = -55$ I_D - Drain Current (A) 3 2 $T_C = 25$ °C 1 $T_C = 125$ 0.5 0.0 1.0 1.5 3.0

 V_{GS} - Gate-to-Source Voltage (V) **Transfer Characteristics**

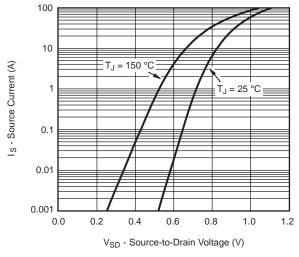


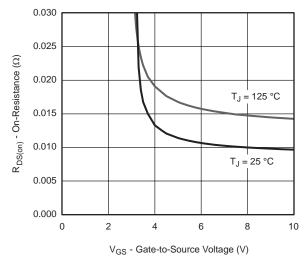
Capacitance



On-Resistance vs. Junction Temperature

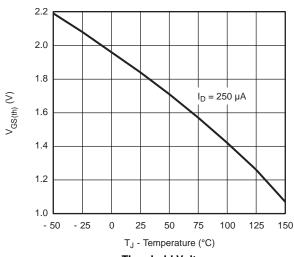


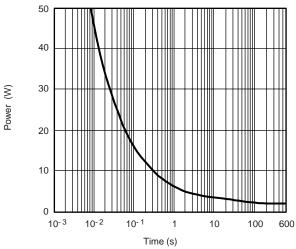




Source-Drain Diode Forward Voltage

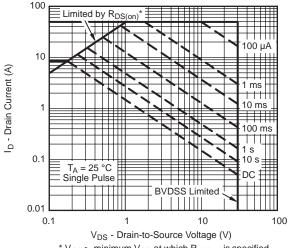






Threshold Voltage

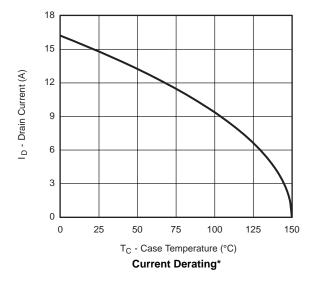
Single Pulse Power, Junction-to-Ambient

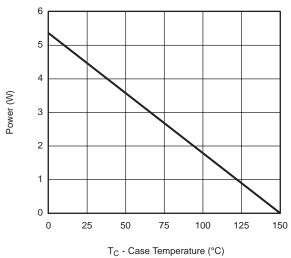


* $V_{\mbox{\footnotesize{GS}}} >$ minimum $V_{\mbox{\footnotesize{GS}}}$ at which $R_{\mbox{\footnotesize{DS(on)}}}$ is specified

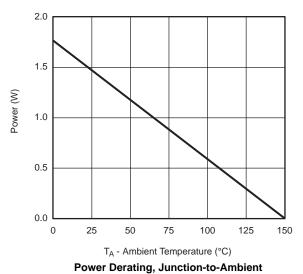
Safe Operating Area, Junction-to-Ambient





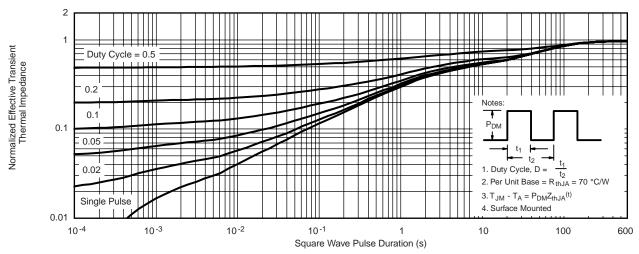


Power Derating, Junction-to-Foot



* The power dissipation P_D is based on $T_{J(max)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.





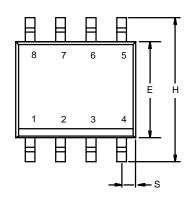
Normalized Thermal Transient Impedance, Junction-to-Ambient

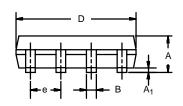


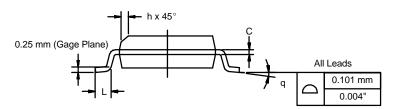
Normalized Thermal Transient Impedance, Junction-to-Foot



SOIC (NARROW): 8-LEAD







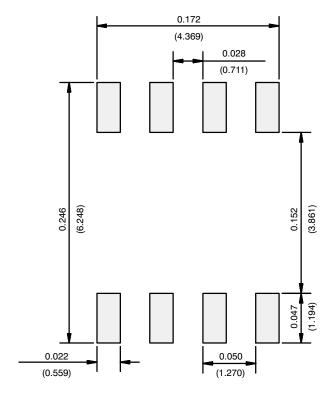
	MILLIMETERS		INC	HES		
DIM	Min	Max	Min	Max		
Α	1.35	1.75	0.053	0.069		
A ₁	0.10	0.20	0.004	0.008		
В	0.35	0.51	0.014	0.020		
С	0.19	0.25	0.0075	0.010		
D	4.80	5.00	0.189	0.196		
Е	3.80	4.00	0.150	0.157		
е	1.27 BSC		0.050 BSC			
Н	5.80	6.20	0.228	0.244		
h	0.25	0.50	0.010	0.020		
L	0.50	0.93	0.020	0.037		
q	0°	8°	0°	8°		
S	0.44	0.64	0.018	0.026		
FCN: C-06527-Rev 11-Sen-06						

ECN: C-06527-Rev. I, 11-Sep-06

DWG: 5498



RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads Dimensions in Inches/(mm)



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