

## UPA2708GR-VB Datasheet N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY							
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)				
30	0.004 at V <sub>GS</sub> = 10 V	18	6.8 nC				
30	0.005 at V <sub>GS</sub> = 4.5 V	16	0.0110				

SO-8

Top View

8 D

D

6 D

5 D

S

S

S

G

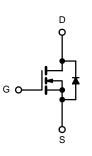
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## FEATURES

- Halogen-free
- Trench Power MOSFET
- Optimized for High-Side Synchronous Rectifier Operation
- 100 % R<sub>g</sub> Tested
- 100 % UIS Tested

### **APPLICATIONS**

Notebook CPU Core
High-Side Switch



N-Channel MOSFET

ABSOLUTE MAXIMUM RATING	~ <i>`</i>					
Parameter		Symbol	Limit	Unit		
Drain-Source Voltage		V <sub>DS</sub>	30	V		
Gate-Source Voltage		V <sub>GS</sub>	± 20	v		
	T <sub>C</sub> = 25 °C		18			
Continuous Drain Current (T <sub>J</sub> = 150 °C)	T <sub>C</sub> = 70 °C	1_	16			
Continuous Drain Current (1) = 130°C)	T <sub>A</sub> = 25 °C	I <sub>D</sub>	15 <sup>b, c</sup>			
	T <sub>A</sub> = 70 °C		13 <sup>b, c</sup>	А		
Pulsed Drain Current		I <sub>DM</sub>	50			
Ossiliana Ossila Dista Ossila	T <sub>C</sub> = 25 °C	L.	3.8			
Continuous Source-Drain Diode Current	T <sub>A</sub> = 25 °C	I <sub>S</sub> –	2.1 <sup>b, c</sup>			
Single Pulse Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	22			
Avalanche Energy		E <sub>AS</sub>	24	mJ		
	T <sub>C</sub> = 25 °C	- P <sub>D</sub>	4.5			
Maximum Dawar Disaination	T <sub>C</sub> = 70 °C		2.8	w		
Maximum Power Dissipation	T <sub>A</sub> = 25 °C	'D	2.5 <sup>b, c</sup>	vv		
	T <sub>A</sub> = 70 °C	F	1.6 <sup>b, c</sup>			
Operating Junction and Storage Temperature Ra	T <sub>J</sub> , T <sub>stq</sub>	- 55 to 150	°C			

THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>b, d</sup>	$t \le 10 \text{ s}$	R <sub>thJA</sub>	38	50	°C/W	
Maximum Junction-to-Foot (Drain)	Steady State	R <sub>thJF</sub>	22	28	0/11	

Notes:

a. Base on T<sub>C</sub> = 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.

5	3	® V	Bs	em	i
W	ww.V	/Bs	sem	i.cor	n

<b>SPECIFICATIONS</b> $T_J = 25 \text{ °C}$ Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit
Static	cymsei			.,,,,	maxi	••••
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 µA	30			V
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$			28		-
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I <sub>D</sub> = 250 μA		- 6		mV/°C
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_{D} = 250 \ \mu A$	1.0	-	3.0	V
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			± 100	nA
-		$V_{\rm DS} = 30 \text{ V}, \text{ V}_{\rm GS} = 0 \text{ V}$			1	- μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5 V, V_{GS} = 10 V$	20			А
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 11 A	0.004			
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A				Ω
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 11 A		52		S
Dynamic <sup>b</sup>					<b></b>	1
Input Capacitance	C <sub>iss</sub>			820		
Output Capacitance	C <sub>oss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		195		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	20 00		73		
		$V_{DS} = 15 \text{ V}, V_{GS} = 10 \text{ V}, I_{D} = 11 \text{ A}$		15	23	nC
Total Gate Charge	Qg			6.8	10.2	
Gate-Source Charge	Q <sub>gs</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 5 \text{ V}, I_{D} = 11 \text{ A}$		2.5		
Gate-Drain Charge	Q <sub>gd</sub>			2.3		
Gate Resistance	R <sub>g</sub>	f = 1 MHz	0.36	1.8	3.6	Ω
Turn-On Delay Time	t <sub>d(on)</sub>			16	24	
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, $R_L$ = 1.4 $\Omega$		12	18	-
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ 9 A, $V_{GEN}$ = 4.5 V, $R_g$ = 1 $\Omega$		16	24	
Fall Time	t <sub>f</sub>			10	20	
Turn-On Delay Time	t <sub>d(on)</sub>			8	16	ns 
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, $R_L$ = 1.4 $\Omega$		10	20	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ 9 A, $V_{GEN}$ = 10 V, $R_g$ = 1 $\Omega$		16	24	
Fall Time	t <sub>f</sub>			8	15	1
Drain-Source Body Diode Characteris	lics					
Continuous Source-Drain Diode Current	ا <sub>S</sub>	T <sub>C</sub> = 25 °C			25	٨
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				50	A
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = 9 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>			15	30	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			6	12	nC
Reverse Recovery Fall Time	t <sub>a</sub>	$I_F = 9 \text{ A}, \text{ dI/dt} = 100 \text{ A/}\mu\text{s}, \text{ T}_J = 25 ^\circ\text{C}$		8		
Reverse Recovery Rise Time	t <sub>b</sub>			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.

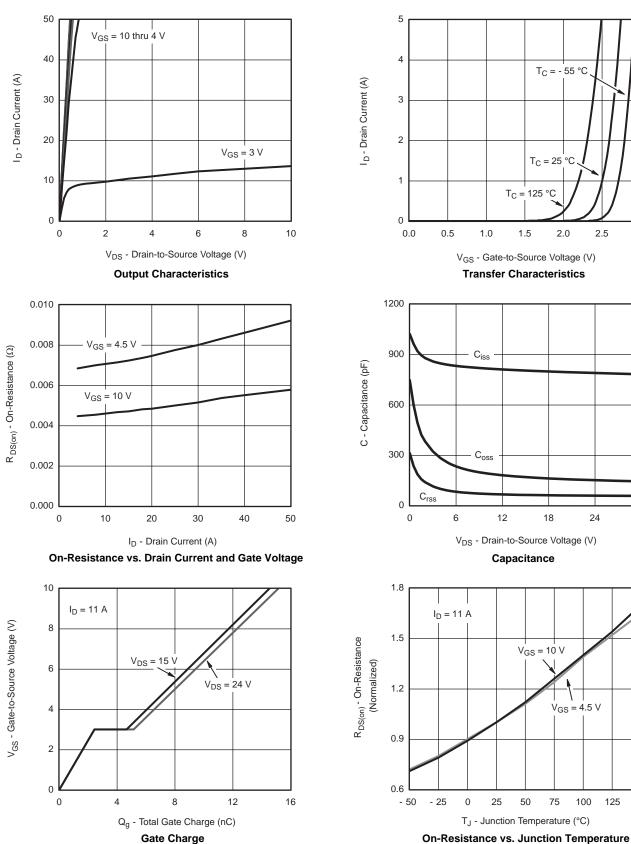
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



3.0

30

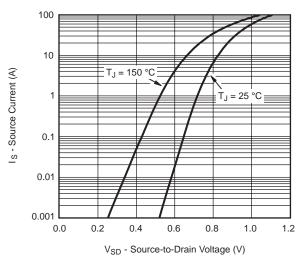
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



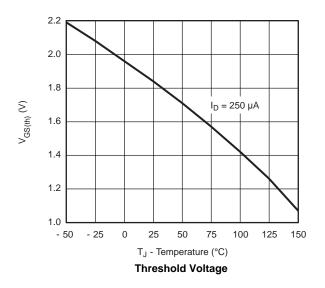
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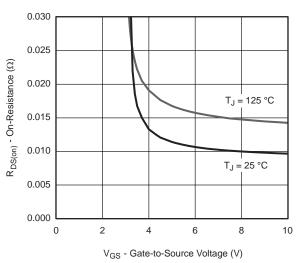


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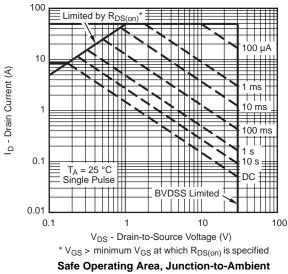




On-Resistance vs. Gate-to-Source Voltage

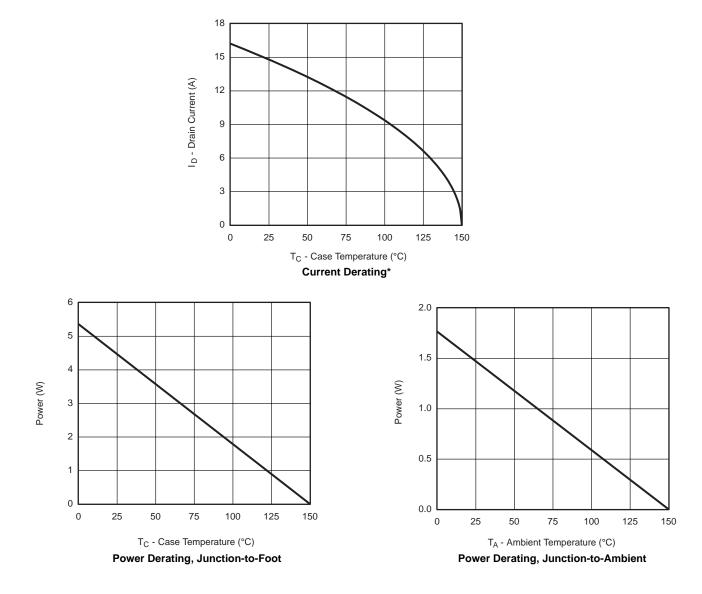








## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



\* 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.

2



#### 1 Normalized Effective Transient Thermal Impedance Duty Cycle = 0.5 0.2 Notes: ı] 0.1 4 P<sub>DM</sub> 0.1 0.05 ∰ t<sub>1</sub> ŀ t2 t<sub>1</sub> 0.02 1. Duty Cycle, D = Т t<sub>2</sub> 2. Per Unit Base = $R_{thJA} = 70 \text{ °C/W}$ 3. $T_{JM}$ - $T_A = P_{DM}Z_{thJA}^{(t)}$ Single Pulse 4. Surface Mounted - 1 0.01 10-4 10<sup>-3</sup> 10<sup>-2</sup> 10-1 10 100 600 1 Square Wave Pulse Duration (s) Normalized Thermal Transient Impedance, Junction-to-Ambient 2 1 Normalized Effective Transient Thermal Impedance Duty Cycle = 0.5 0.2 H 0.1 0.1 0.05 +++0.02 Single Pulse 0.01 1.1.1 10-2 10-4 10<sup>-3</sup> 10-1 1 10 Square Wave Pulse Duration (s)

## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Normalized Thermal Transient Impedance, Junction-to-Foot



## SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012





	MILLIMETERS		INC	HES	
DIM	Min	Max	Min	Max	
A	1.35	1.75	0.053	0.069	
A <sub>1</sub>	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	
E	3.80	4.00	0.150	0.157	
e	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	
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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