

# SI7884DP-T1-GE3-VB Datasheet N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY						
V <sub>DS</sub> (V)	$R_{DS(on)}(\Omega)$	I <sub>D</sub> (A) <sup>a, e</sup>	Q <sub>g</sub> (Typ)			
30	0.007 at V <sub>GS</sub> = 10 V	80	31 nC			
30	0.009 at V <sub>GS</sub> = 4.5 V	60	31110			



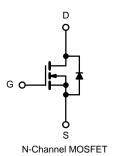
#### **FEATURES**

- Trench Power MOSFET
- 100 % R<sub>g</sub> and UIS Tested
- Compliant to RoHS Directive 2011/65/EU



#### **APPLICATIONS**

- OR-ing
- Server
- DC/DC



<b>ABSOLUTE MAXIMUM RATINGS (T)</b>	$_{A}$ = 25 °C, unle	ess otherwise	noted)			
Parameter	Symbol	Limit		Unit		
Drain-Source Voltage		V <sub>DS</sub>	30		V	
Gate-Source Voltage	$V_{GS}$	± 20		<b>V</b>		
	T <sub>C</sub> = 25 °C		80			
Continuous Drain Current (T <sub>J</sub> = 175 °C)	T <sub>C</sub> = 70 °C	L	60			
Continuous Diam Current (1) = 173 C)	T <sub>A</sub> = 25 °C	l <sub>D</sub>	50b, c		A	
	T <sub>A</sub> = 70 °C		45 <sup>b, c</sup>			
Pulsed Drain Current		I <sub>DM</sub>	210			
Avalanche Current Pulse	L = 0.1 mH	I <sub>AS</sub>	60		]	
Single Pulse Avalanche Energy		E <sub>AS</sub>	95		mJ	
Continuous Source-Drain Diode Current	T <sub>C</sub> = 25 °C	I <sub>S</sub>	80		A	
Continuous Source-Diam Diode Current	T <sub>A</sub> = 25 °C	'S	60			
Maximum Power Dissipation	T <sub>C</sub> = 25 °C	P <sub>D</sub>	155		10/	
Waximum Fower Dissipation	T <sub>C</sub> = 70 °C	r <sub>D</sub>	105		W	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 175		°C	
THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Тур.	Max.	Unit	
Maximum Junction-to-Ambient <sup>b, d</sup>	t ≤ 10 sec	R <sub>thJA</sub>	32	40	°C/W	
Maximum Junction-to-Case	Steady State	R <sub>thJC</sub>	0.5 0.6			

- a. Based on T<sub>C</sub> = 25 °C.
  b. Surface mounted on 1" x 1" FR4 board.
- d. Maximum under steady state conditions is 90 °C/W.
- e. Calculated based on maximum junction temperature. Package limitation current is 90 A.



Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	30			V
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	I <sub>D</sub> = 250 μA		35		m\//°C
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I <sub>D</sub> = 250 μA		- 7.5		mV/°C
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = 250 \mu A$	0.5		2.0	V
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zara Cata Valta na Dunia Comunat	1	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$			1	μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55 ^{\circ}\text{C}$			10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$	90			Α
	D	$V_{GS} = 10 \text{ V}, I_D = 30.8 \text{ A}$		0.007		Ω
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	$V_{GS} = 4.5 \text{ V}, I_D = 27 \text{ A}$		0.009		
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30.8 A		160		S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>				1180	pF
Output Capacitance	C <sub>oss</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$			425	
Reverse Transfer Capacitance	C <sub>rss</sub>				170	
Total Oats Ohama	Qg	$V_{DS} = 15 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 30.8 \text{ A}$			61	nC
Total Gate Charge					31.5	
Gate-Source Charge	Q <sub>gs</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 4.5 \text{ V}, I_{D} = 27.8 \text{ A}$			10	
Gate-Drain Charge	Q <sub>gd</sub>				6	
Gate Resistance	R <sub>g</sub>	f = 1 MHz		1.4	2.1	Ω
Turn-On Delay Time	t <sub>d(on)</sub>			18	27	ns
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, $R_L$ = 0.625 $\Omega$		11	17	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D\cong 24$ A, $V_{GEN}$ = 10 V, $R_g$ = 1 $\Omega$		70	105	
Fall Time	t <sub>f</sub>			10	15	
Turn-On Delay Time	t <sub>d(on)</sub>			55	83	
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, $R_L$ = 0.67 $\Omega$		180	270	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D\cong 22.5$ A, $V_{GEN}$ = 4.5 V, $R_g$ = 1 $\Omega$		55	83	
Fall Time	t <sub>f</sub>			12	18	
<b>Drain-Source Body Diode Characteristic</b>	es					
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C		60		A
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>			210		
Body Diode Voltage	$V_{SD}$	I <sub>S</sub> = 22 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>			52	78	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	L_ = 20 A di/dt = 100 A/vo T = 25 °C		70.2	105	nC
Reverse Recovery Fall Time	t <sub>a</sub>	$I_F = 20 \text{ A}, \text{ di/dt} = 100 \text{ A/}\mu\text{s}, T_J = 25 \text{ °C}$		27		ns
Reverse Recovery Rise Time	t <sub>b</sub>			25		

#### Notes:

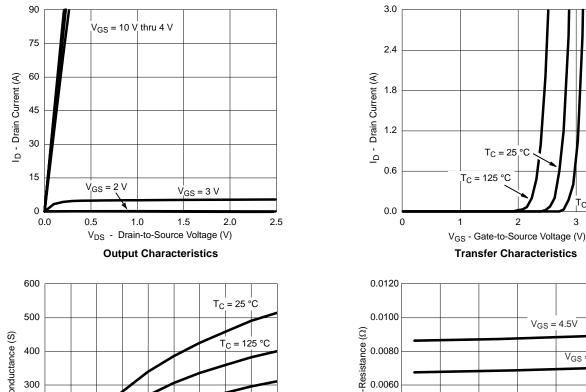
- a. Pulse test; pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.

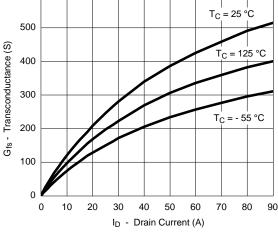
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

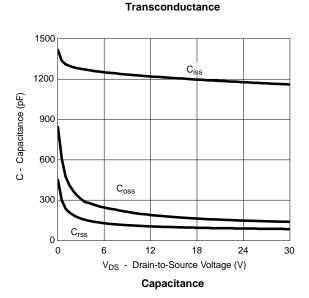


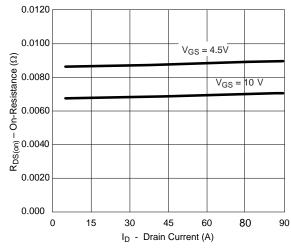
T<sub>C</sub> = - 55 °C

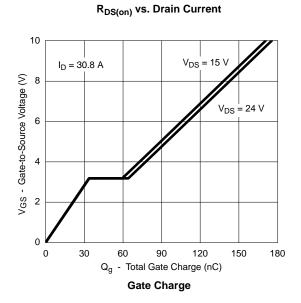
### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)





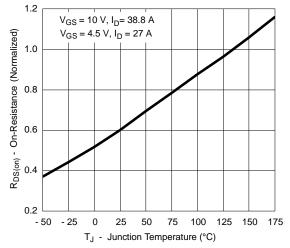








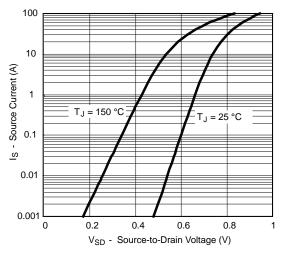
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On-Resistance vs. Junction Temperature



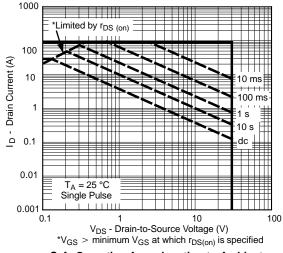
 $R_{DS(on)}$  vs.  $V_{GS}$  vs. Temperature



Forward Diode Voltage vs. Temperature



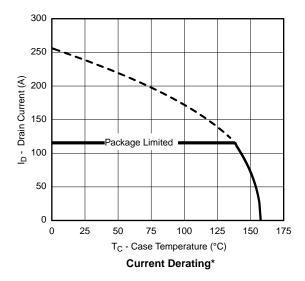
Threshold Voltage

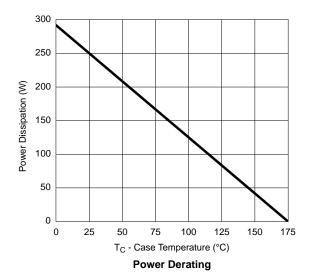


Safe Operating Area, Junction-to-Ambient

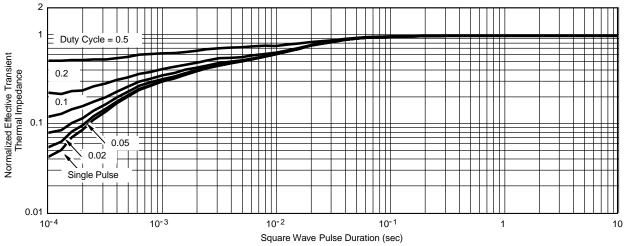


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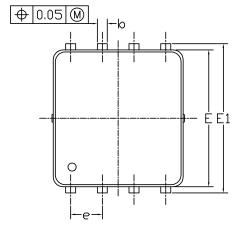
\*The power dissipation  $P_D$  is based on  $T_{J(max)}$  = 175 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

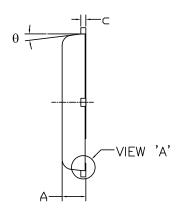


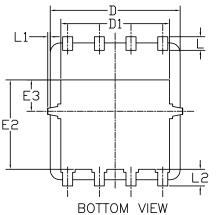
Normalized Thermal Transient Impedance, Junction-to-Case

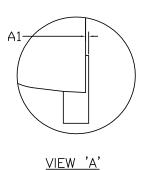


DFN5x6\_8L\_EP1\_P PACKAGE OUTLIN



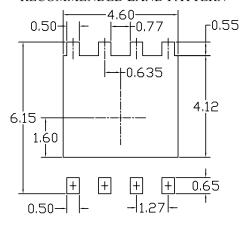






(SCALE 5:1)

RECOMMENDED LAND PATTERN



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES			
STMBOLS	MIN	NOM	MAX	MIN	NOM	MAX	
A	0.85	0. 95	1.00	0.033	0. 037	0.039	
A1	0.00		0.05	0.000		0.002	
b	0.30	0.40	0.50	0.012	0.016	0.020	
c	0.15	0. 20	0. 25	0.006	0.008	0.010	
D	5. 10	5. 20	5. 30	0. 201	0. 205	0. 209	
D1	4. 25	4. 35	4. 45	0. 167	0.171	0. 175	
Е	5. 45	5. 55	5. 65	0.215	0.219	0. 222	
E1	5. 95	6.05	6. 15	0. 234	0. 238	0. 242	
E2	3. 525	3.625	3. 725	0.139	0. 143	0. 147	
E3	1. 175	1. 275	1.375	0.046	0.050	0.054	
e	1. 27 BSC			0.050 BSC			
L	0.45	0. 55	0.65	0.018	0.022	0.026	
L1	0		0.15	0		0.006	
L2	0.68 REF		0.027 REF				
θ	0°		10°	0°		10°	

NOTE UNIT: mm

- 1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS. MOLD FLASH AT THE NON-LEAD SIDES SHOULD BE LESS THAN 6 MILS EACH.
- 2. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.



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