

## Dual N-Channel 20-V (D-S) MOSFET, Common Drain

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
20	0.026 at $V_{GS} = 4.5$ V	8.5
	0.030 at $V_{GS} = 2.5$ V	8
	0.036 at $V_{GS} = 1.8$ V	7

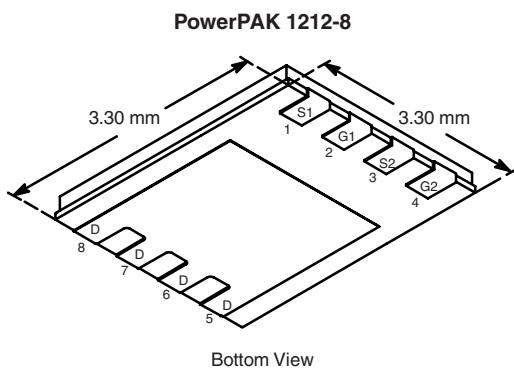
### FEATURES

- Halogen-free Option Available
- TrenchFET<sup>®</sup> Power MOSFET: 1.8 V Rated
- New PowerPak<sup>®</sup> Package
  - Low Thermal Resistance,  $R_{thJC}$
  - Low 1.07 mm Profile
- 3000 V ESD Protection


**RoHS**  
COMPLIANT

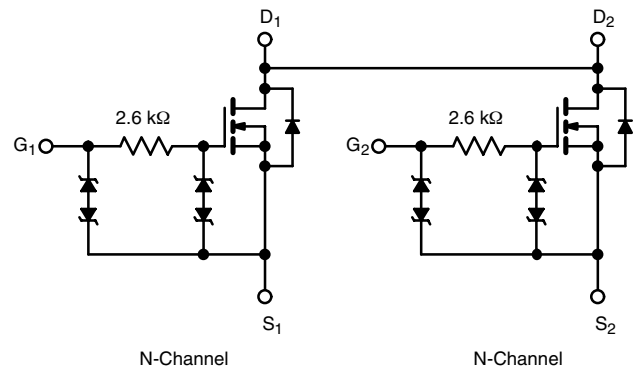
### APPLICATIONS

- Protection Switch for 1-2 Li-ion Batteries



Bottom View

Ordering Information: Si7900AEDN-T1-E3 (Lead (Pb)-free)  
Si7900AEDN-T1-GE3 (Lead (Pb)-free and Halogen-free)



N-Channel

N-Channel

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

Parameter	Symbol	10 s	Steady State	Unit	
Drain-Source Voltage	$V_{DS}$	20		V	
Gate-Source Voltage	$V_{GS}$	$\pm 12$			
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>	$I_D$	$T_A = 25$ °C	8.5	6	A
		$T_A = 85$ °C	6.4	4.3	
Pulsed Drain Current	$I_{DM}$	30		A	
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	2.9	1.4		
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25$ °C	3.1	1.5	W
		$T_A = 85$ °C	1.6	0.79	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150		°C	

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	$t \leq 10$ s	32	40	°C/W
		Steady State	65	82	
Maximum Junction-to-Case	$R_{thJC}$	2.2	2.8		

Notes:

a. Surface Mounted on 1" x 1" FR4 board.



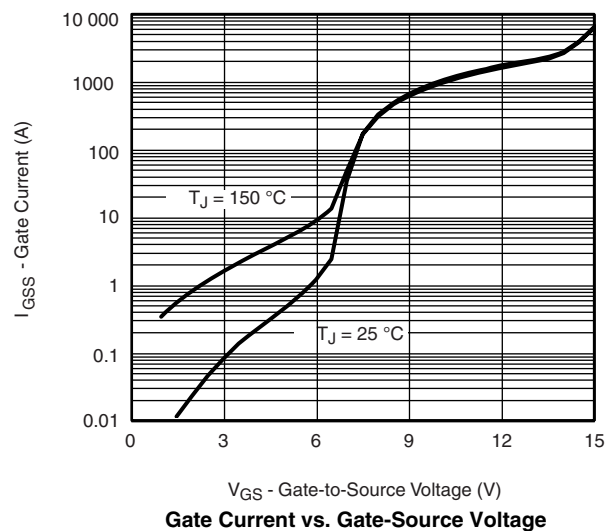
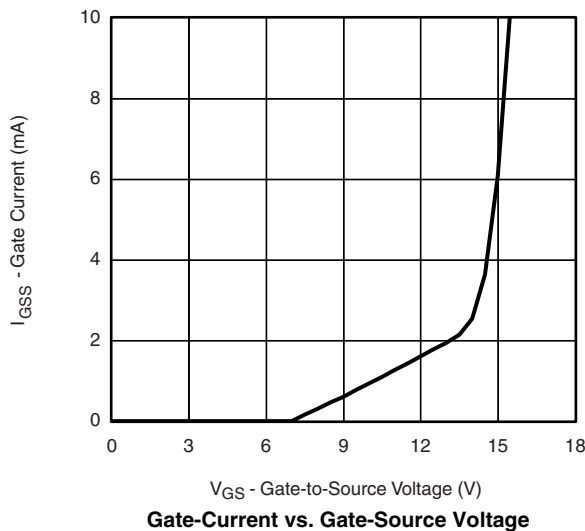
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.40		0.9	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$			$\pm 1$	$\mu\text{A}$
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			$\pm 10$	mA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			20	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 4.5\text{ V}$	20			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 8.5\text{ A}$		0.020	0.026	$\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 8\text{ A}$		0.022	0.030	
		$V_{GS} = 1.8\text{ V}, I_D = 7\text{ A}$		0.026	0.036	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}, I_D = 8.5\text{ A}$		25		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 2.9\text{ A}, V_{GS} = 0\text{ V}$		0.65	1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 6.5\text{ A}$		10.5	16	nC
Gate-Source Charge	$Q_{gs}$			1.9		
Gate-Drain Charge	$Q_{gd}$			1.8		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 4.5\text{ V}, R_G = 6\text{ }\Omega$		0.85	1.25	ns
Rise Time	$t_r$			1.3	2.0	
Turn-Off Delay Time	$t_{d(off)}$			8.6	13	
Fall Time	$t_f$			4.2	6.5	

Notes:

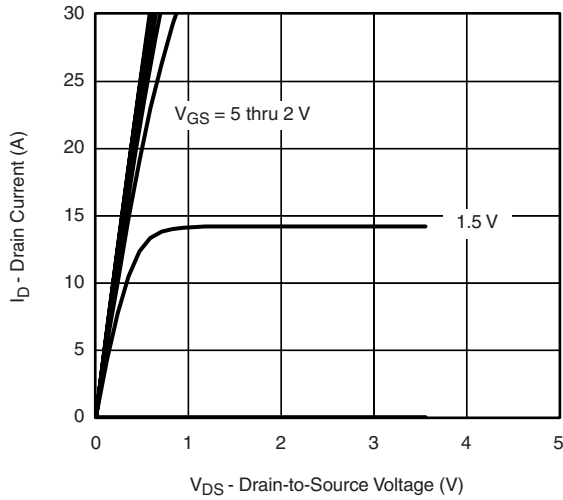
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

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**  $25\text{ }^\circ\text{C}$ , unless otherwise noted

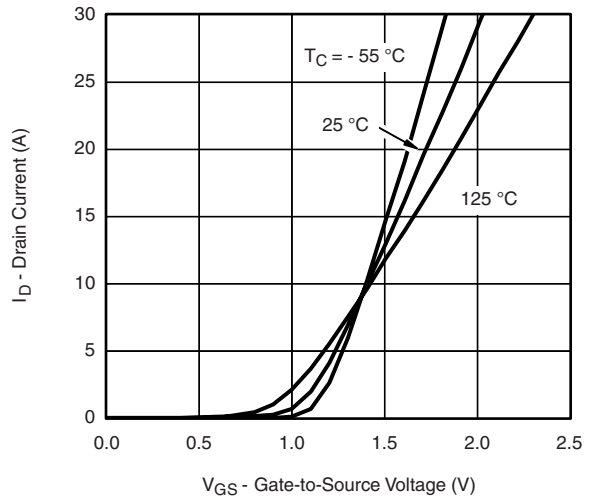


**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



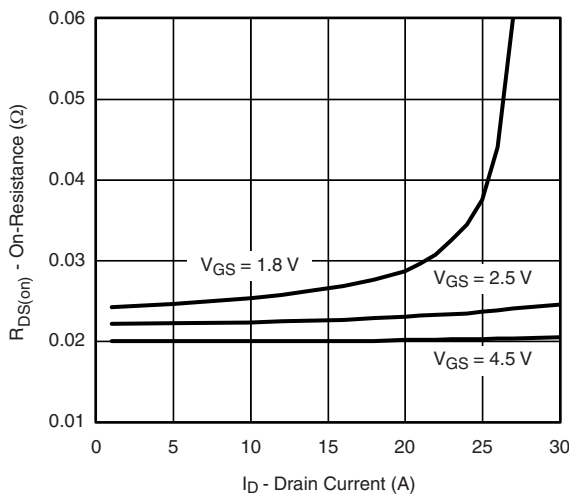
$V_{GS} = 5 \text{ thru } 2 \text{ V}$

**Output Characteristics**



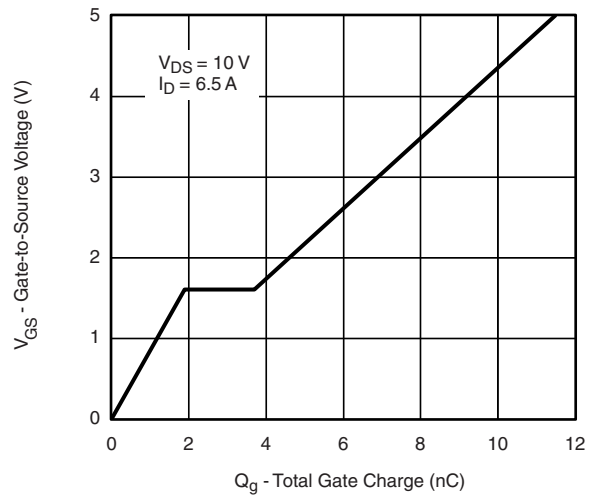
$T_C = -55 \text{ }^\circ\text{C}$   
 $25 \text{ }^\circ\text{C}$   
 $125 \text{ }^\circ\text{C}$

**Transfer Characteristics**



$V_{GS} = 1.8 \text{ V}$   
 $V_{GS} = 2.5 \text{ V}$   
 $V_{GS} = 4.5 \text{ V}$

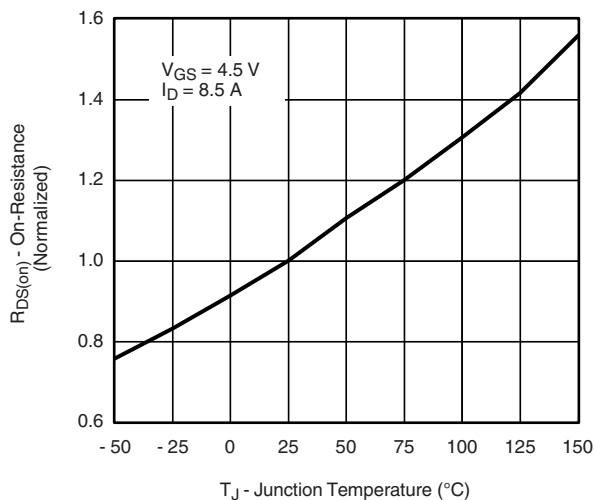
**On-Resistance vs. Drain Current**



$V_{DS} = 10 \text{ V}$   
 $I_D = 6.5 \text{ A}$

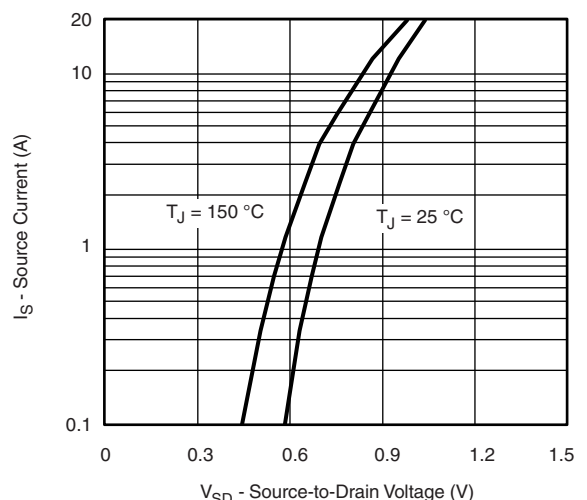
$Q_g$  - Total Gate Charge (nC)

**Gate Charge**



$V_{GS} = 4.5 \text{ V}$   
 $I_D = 8.5 \text{ A}$

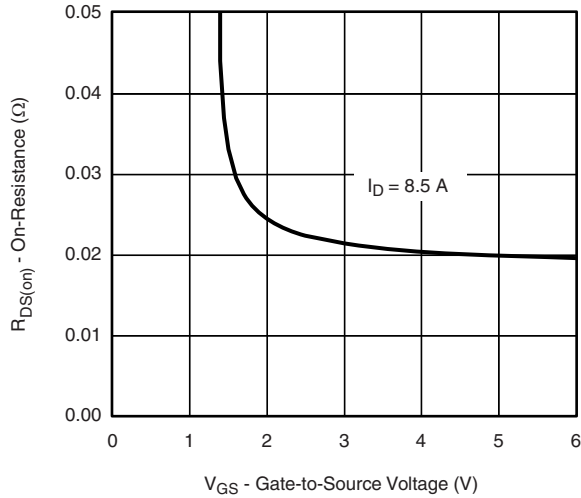
**On-Resistance vs. Junction Temperature**



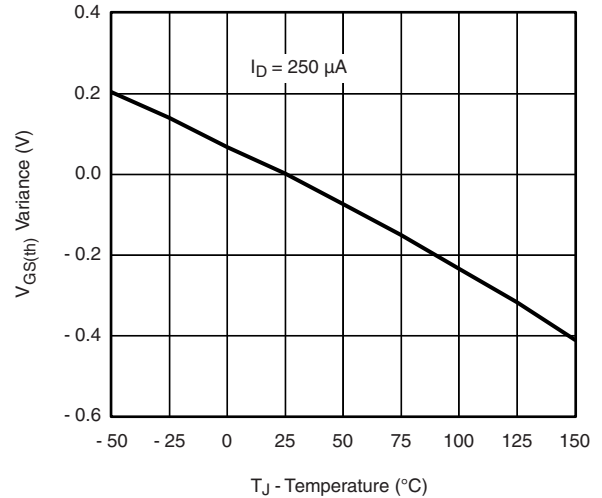
$T_J = 150 \text{ }^\circ\text{C}$   
 $T_J = 25 \text{ }^\circ\text{C}$

**Source-Drain Diode Forward Voltage**

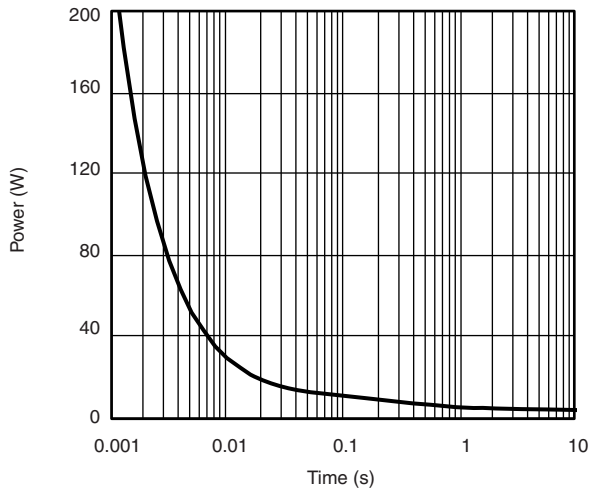
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



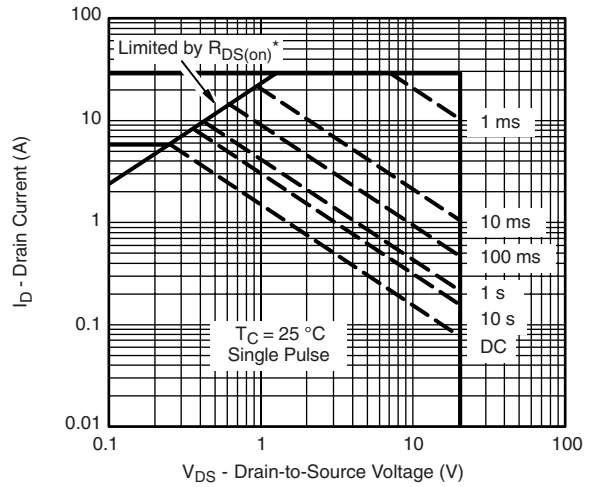
**On-Resistance vs. Gate-to-Source Voltage**



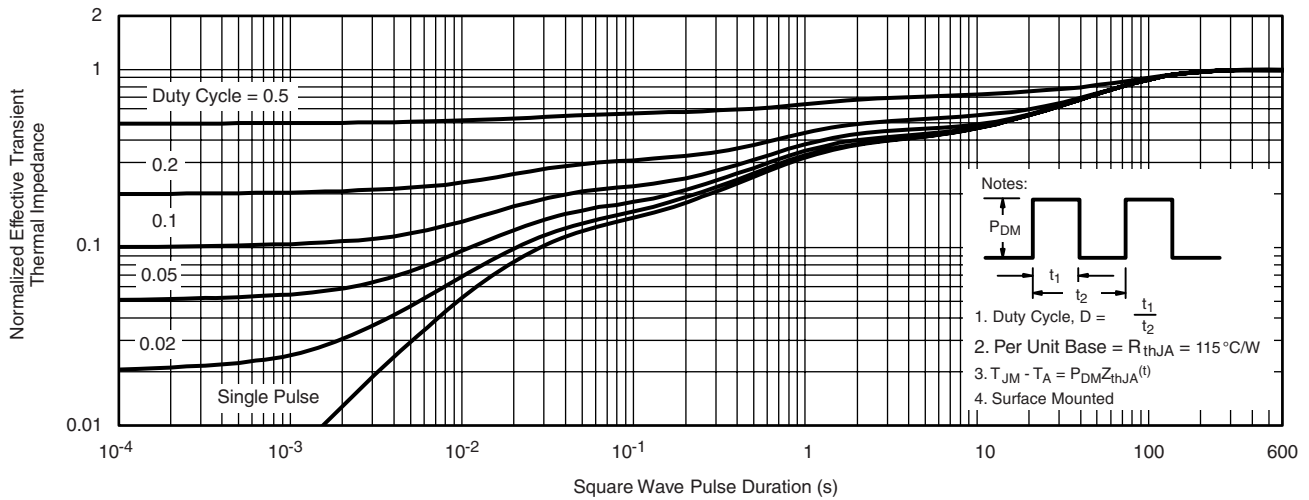
**Threshold Voltage**



**Single Pulse Power, Junction-to-Ambient**



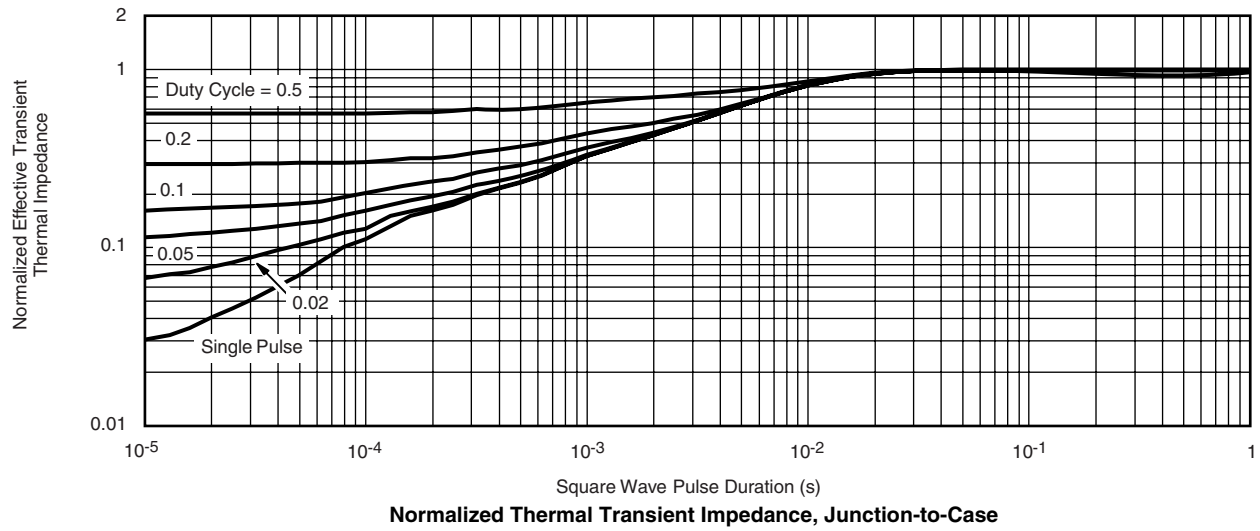
**Safe Operating Area, Junction-to-Case**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



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