Dual N-Channel 30-V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
30	0.022 at V_{GS} = 10 V	10
	0.030 at V_{GS} = 4.5 V	8.5

SCHOTTKY PRODUCT SUMMARY		
V_{DS} (V)	V_{SD} (V) Diode Forward Voltage	I_F (A)
30	0.50 V at 1.0 A	3.0

FEATURES

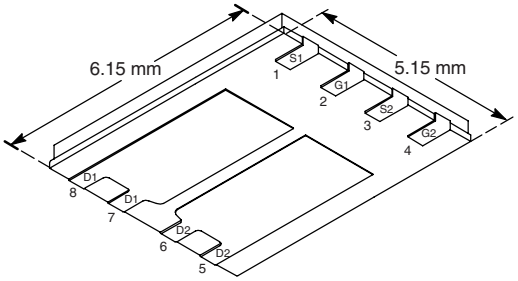
- **Halogen-free According to IEC 61249-2-21 Available**
- LITTLE FOOT® *Plus Schottky*
- New Low Thermal Resistance PowerPAK® Package with Low 1.07 mm Profile
- 100 % R_g Tested

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

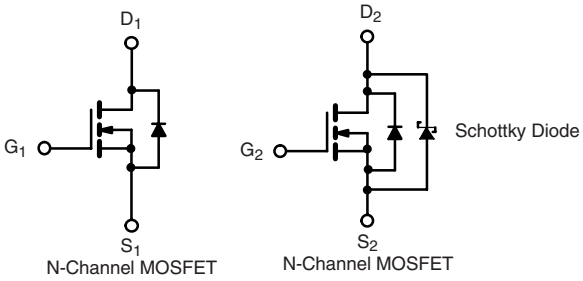
APPLICATIONS

- Bus and Logic DC-DC

PowerPAK SO-8



Bottom View



Ordering Information: Si7842DP-T1-E3 (Lead (Pb)-free)
Si7842DP-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted					
Parameter		**Symbol**	**10 s**	**Steady State**	**Unit**
Drain-Source Voltage		V_{DS}	30		V
Gate-Source Voltage		V_{GS}	± 20		
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	10	6.3	A
	T_A = 70 °C		6.0	5.0	
Pulsed Drain Current		I_{DM}	30		
Continuous Source Current (Diode Conduction)[a]		I_S	2.9	1.1	
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	3.5	1.4	W
	T_A = 70 °C		2.2	0.9	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		°C
Soldering Recommendations (Peak Temperature)[b,c]			260		

THERMAL RESISTANCE RATINGS							
Parameter		**Symbol**	**MOSFET**		**Schottky**		**Unit**
			Typical	**Maximum**	**Typical**	**Maximum**	
Maximum Junction-to-Ambient[a]	t ≤ 10 s	R_{thJA}	26	35	26	35	°C/W
	Steady State		60	85	60	85	
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	3.9	5.5	3.9	5.5	

Notes:
a. Surface Mounted on 1" x 1" FR4 board.
b. See Solder Profile (*www.vishay.com/ppg?73257*). The PowerPAK SO-8 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

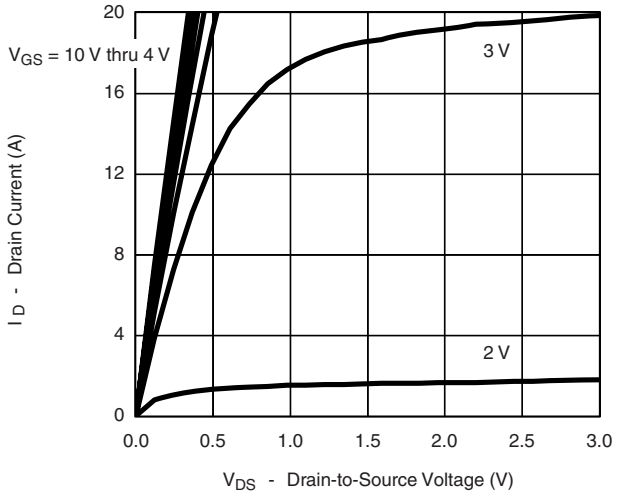
SPECIFICATIONS T_J = 25 °C, unless otherwise noted							
Parameter	**Symbol**	**Test Condition**		**Min.**	**Typ.[b]**	**Max.**	**Unit**
Static							
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		0.8		2.4	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V				± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V	Ch-1			1	µA
			Ch-2			100	
		V_{DS} = 30 V, V_{GS} = 0 V, T_J = 85 °C	Ch-1			15	
			Ch-2			2000	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V		20			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 7.5 A			0.018	0.022	Ω
		V_{GS} = 4.5 V, I_D = 6.5 A			0.024	0.030	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 7.5 A			22		S
Diode Forward Voltage[a]	V_{SD}	I_S = 1 A, V_{GS} = 0 V	Ch-1		0.8	1.2	V
			Ch-2		0.47	0.5	
Dynamic[b]							
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 7.5 A			13	20	nC
Gate-Source Charge	Q_{gs}				2		
Gate-Drain Charge	Q_{gd}				2.7		
Gate Resistance	R_g			0.5	1.2	3.2	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 15 Ω I_D ≅ 1 A, V_{GEN} = 10 V, R_g = 6 Ω			8	16	ns
Rise Time	t_r				10	20	
Turn-Off Delay Time	$t_{d(off)}$				21	40	
Fall Time	t_f				10	20	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 1.7 A, dI/dt = 100 A/µs	Ch-1		40	80	
			Ch-2		32	70	

Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

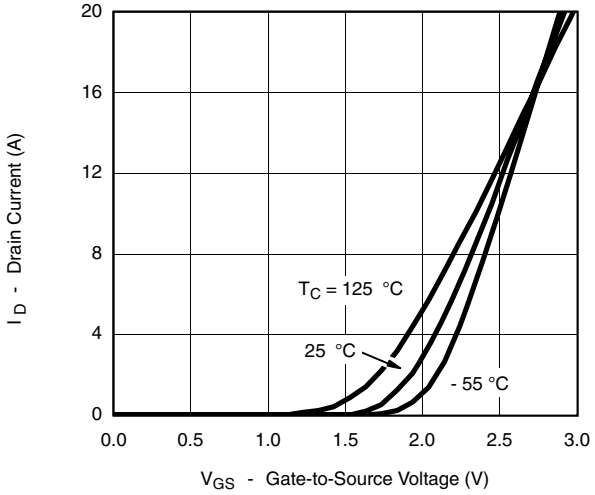
SCHOTTKY SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Condition**	**Min.**	**Typ.**	**Max.**	**Unit**
Forward Voltage Drop	V_F	I_F = 1.0 A		0.47	0.50	V
		I_F = 1.0 A, T_J = 125 °C		0.36	0.42	
Maximum Reverse Leakage Current	I_{rm}	V_r = 30 V		0.004	0.100	mA
		V_r = 30 V, T_J = 100 °C		0.7	10	
		V_r = – 30 V, T_J = 125 °C		3.0	20	
Junction Capacitance	C_T	V_r = 10 V		50		pF

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.

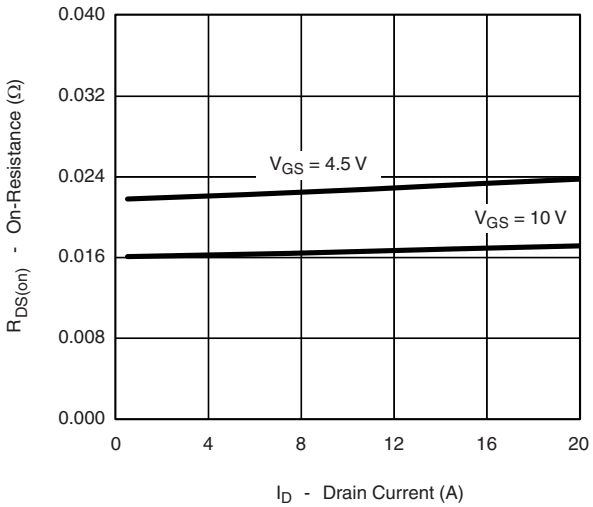
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



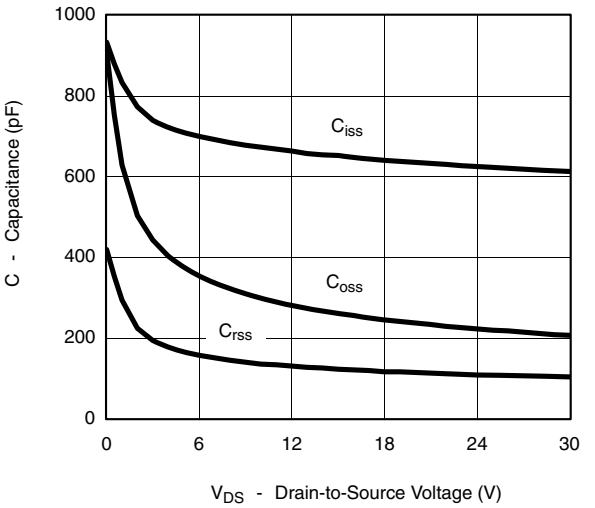
Output Characteristics



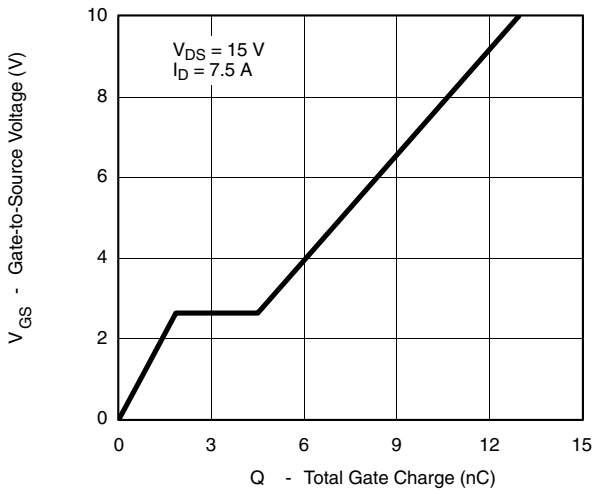
Transfer Characteristics



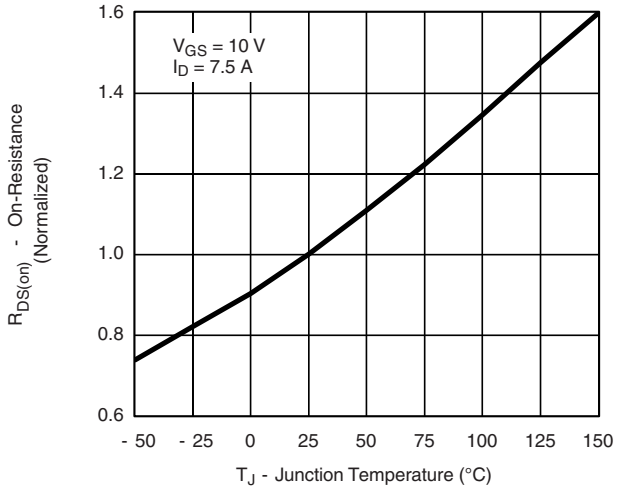
On-Resistance vs. Drain Current



Capacitance

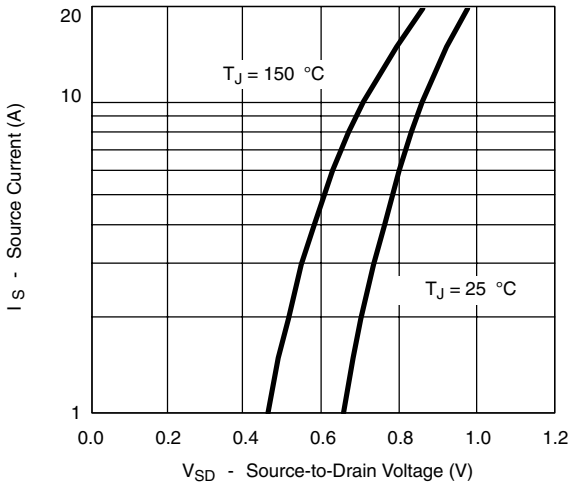


Gate Charge

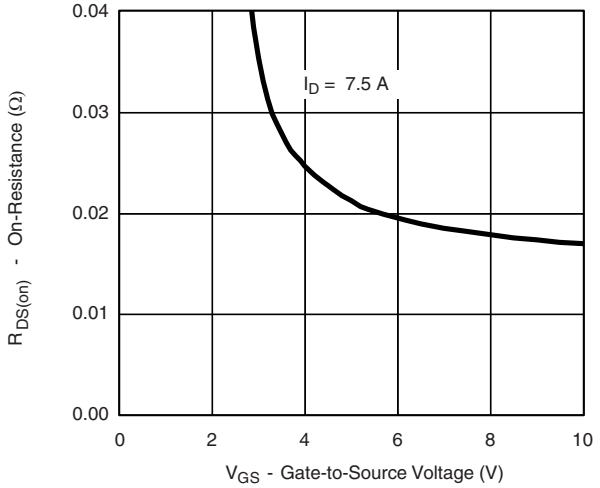


On-Resistance vs. Junction Temperature

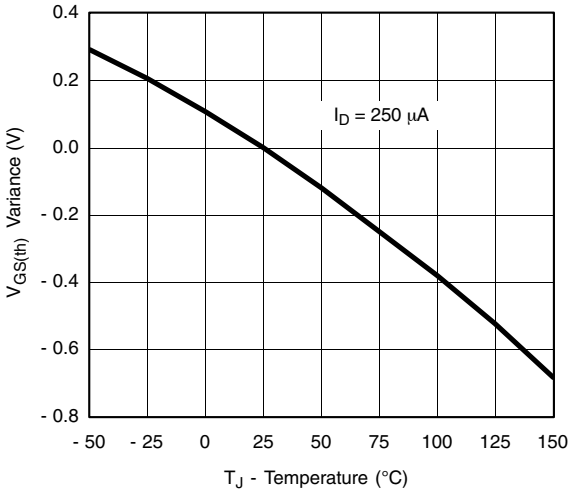
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



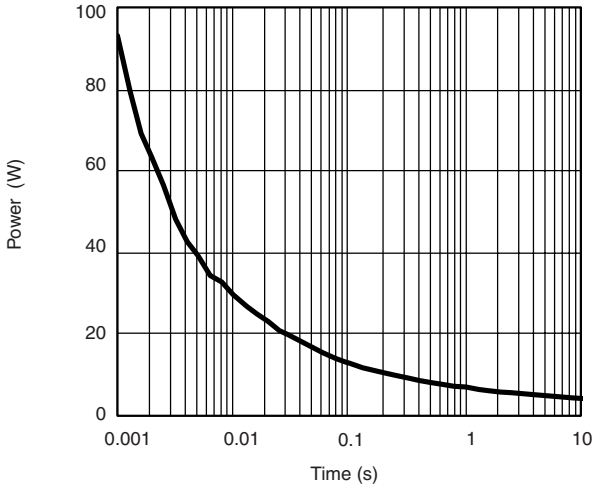
Source-Drain Diode Forward Voltage



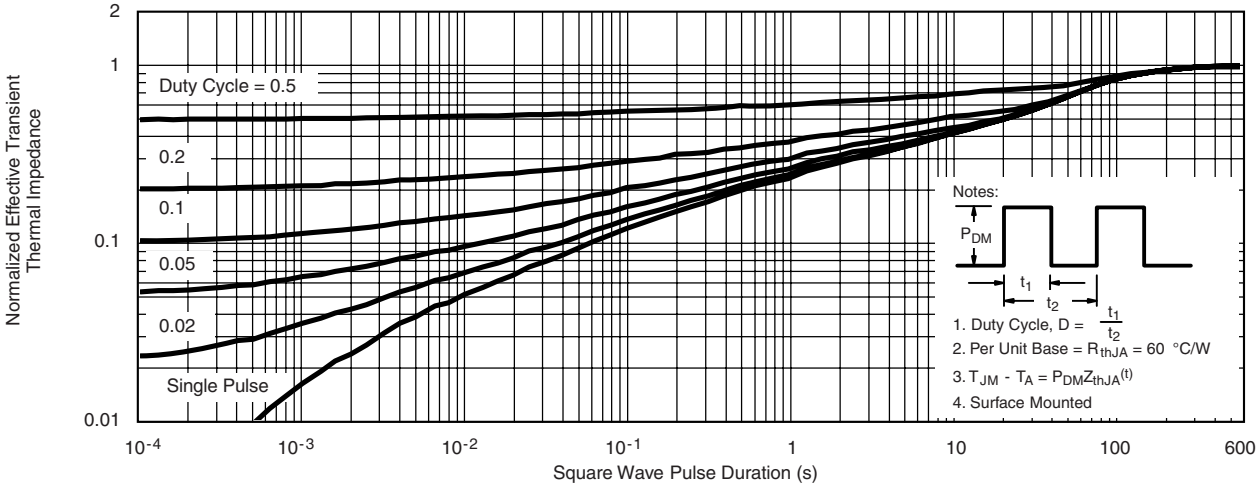
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

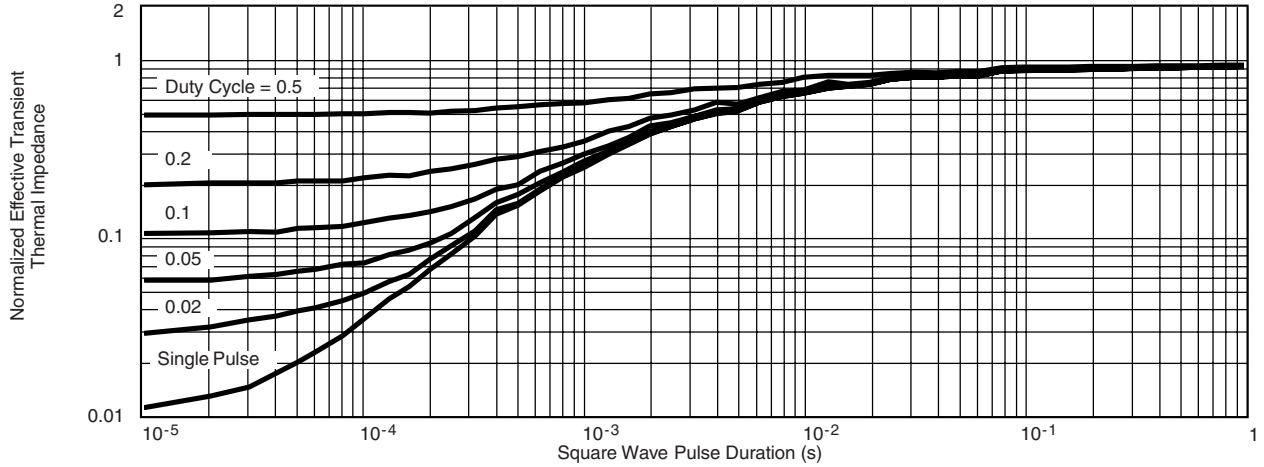


Single Pulse Power



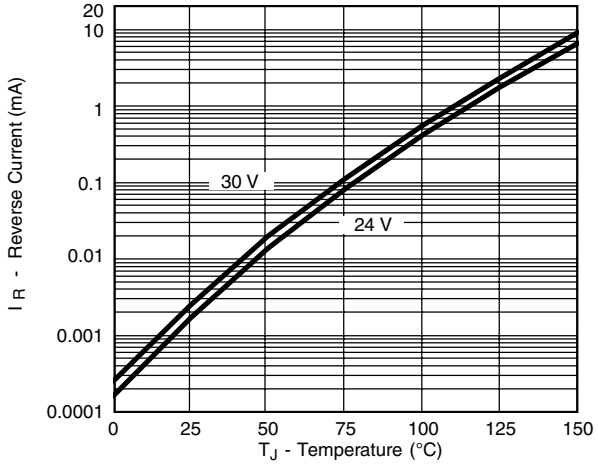
Normalized Thermal Transient Impedance, Junction-to-Ambient

MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

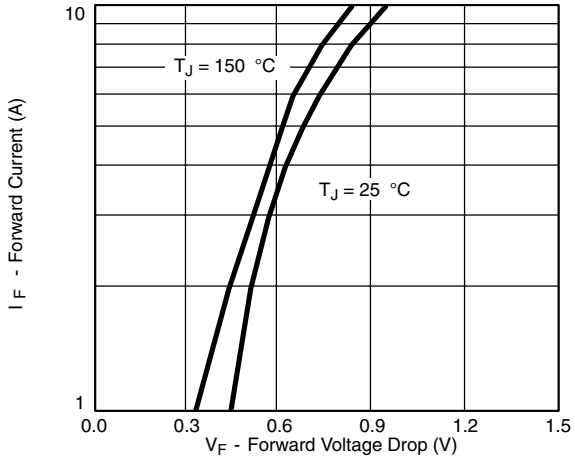


Normalized Thermal Transient Impedance, Junction-to-Case

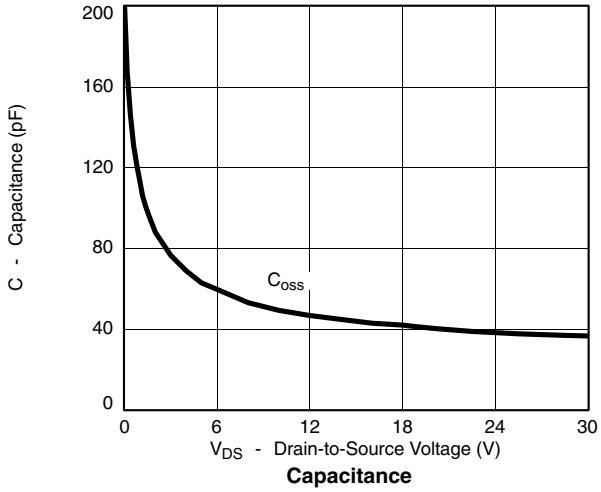
SCHOTTKY TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Reverse Current vs. Junction Temperature



Forward Voltage Drop



Capacitance

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