

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

### Product Summary

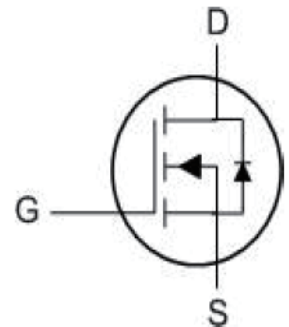
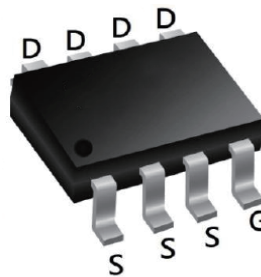
BVDSS	RDS(on)	ID
20V	8mΩ	12A

### Description

The 2012S is the high cell density trenched N-ch MOSFETs, which provide excellent RDS(on) and gate charge for most of the synchronous buck converter applications.

The 2012S meet the RoHS and Green Product, requirement with full function reliability approved

### SOP8 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	20	V
V <sub>GS</sub>	Gate-Source Voltage	±12	V
I <sub>D</sub> @T <sub>A</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ 4.5V <sub>1</sub>	12	A
I <sub>D</sub> @T <sub>A</sub> =70°C	Continuous Drain Current, V <sub>GS</sub> @ 4.5V <sub>1</sub>	7	A
I <sub>DM</sub>	Pulsed Drain Current <sub>2</sub>	34	A
P <sub>D</sub> @T <sub>A</sub> =25°C	Total Power Dissipation <sub>3</sub>	3	W
P <sub>D</sub> @T <sub>A</sub> =70°C	Total Power Dissipation <sub>3</sub>	0.86	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

### Thermal Data

Symbol	Parameter	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-ambient <sub>1</sub>	100	°C/W

**Electrical Characteristics ( $T_J = 25^\circ\text{C}$  unless otherwise specified)**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	20	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=20V, V_{GS}=0V,$	-	-	1	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.75	1.2	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note3</small>	$V_{GS}=4.5V, I_D=15A$	-	8	11.2	m $\Omega$
		$V_{GS}=2.5V, I_D=10A$	-	11.7	17.5	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=10V, V_{GS}=0V,$ $f=1.0MHz$	-	1000	-	pF
$C_{oss}$	Output Capacitance		-	182	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	164	-	pF
$Q_g$	Total Gate Charge	$V_{DS}=10V, I_D=15A,$ $V_{GS}=4.5V$	-	15	-	nC
$Q_{gs}$	Gate-Source Charge		-	2	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	5.2	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=10V, I_D=15A,$ $R_{GEN}=3\Omega, V_{GS}=4.5V$	-	9	-	ns
$t_r$	Turn-on Rise Time		-	25	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	37	-	ns
$t_f$	Turn-off Fall Time		-	14	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	40	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	120	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=30A$	-	-	1.2	V

**Notes:**

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition:  $T_J=25^\circ\text{C}, V_{DD}=10V, V_G=4.5V, L=0.5mH, R_G=25\Omega, I_{AS}=9.6A$
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 0.5\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

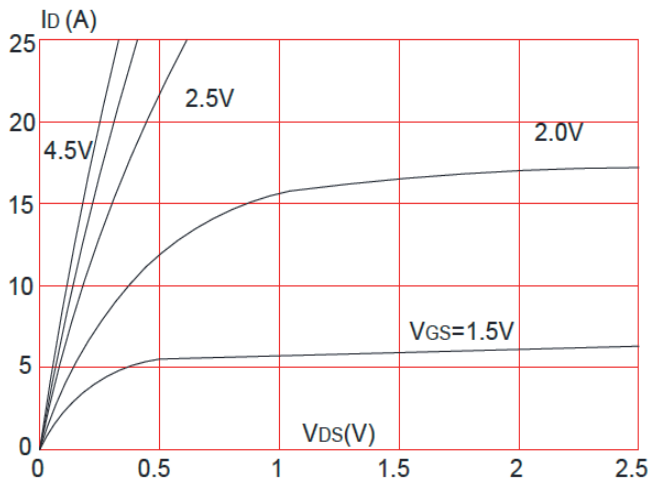


Figure 2: Typical Transfer Characteristics

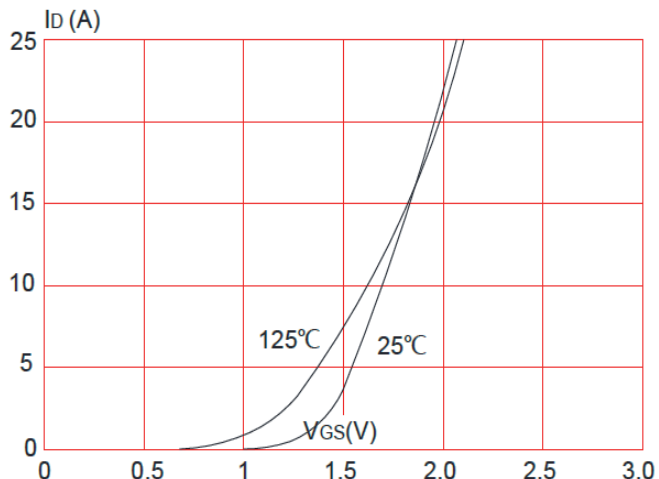


Figure 3: On-resistance vs. Drain Current

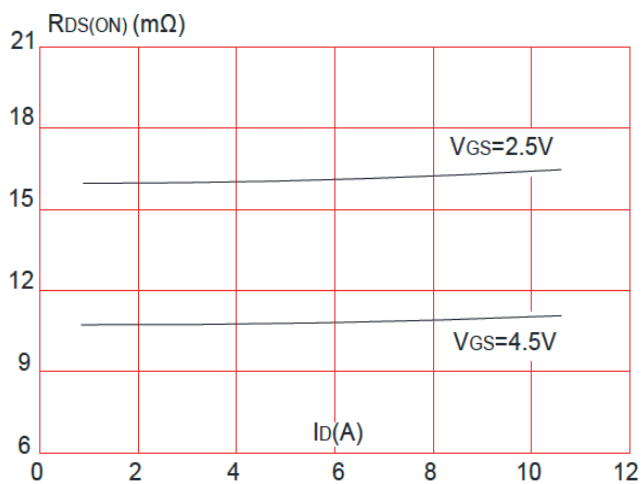


Figure 4: Body Diode Characteristics

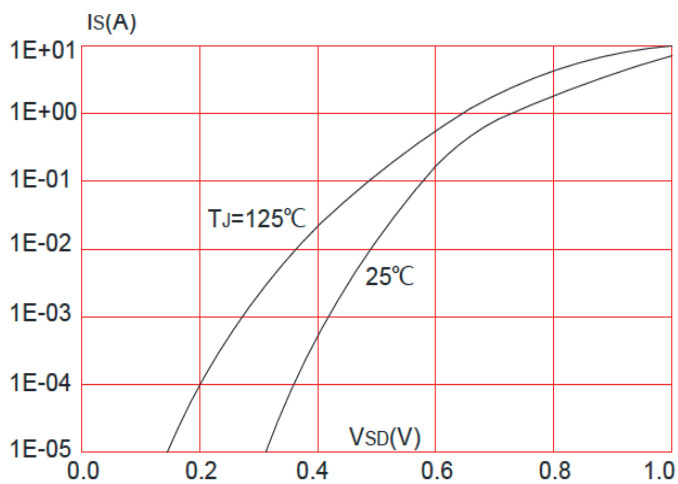


Figure 5: Gate Charge Characteristics

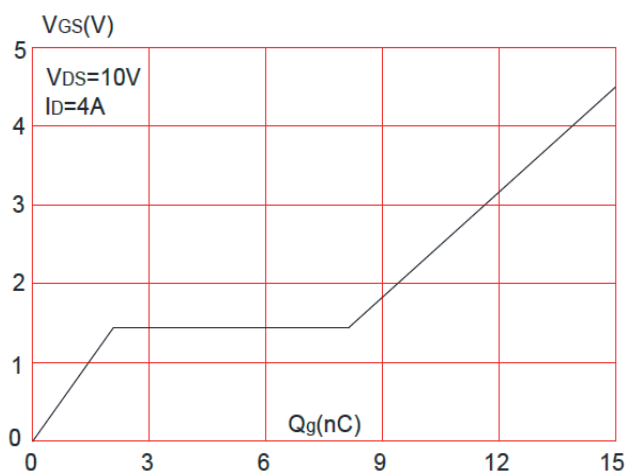
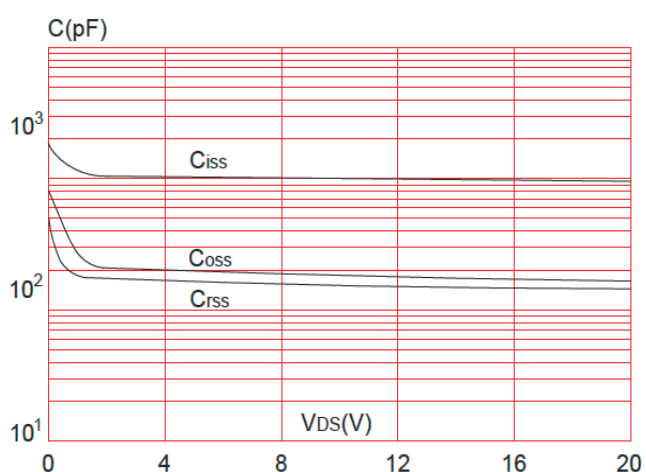


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

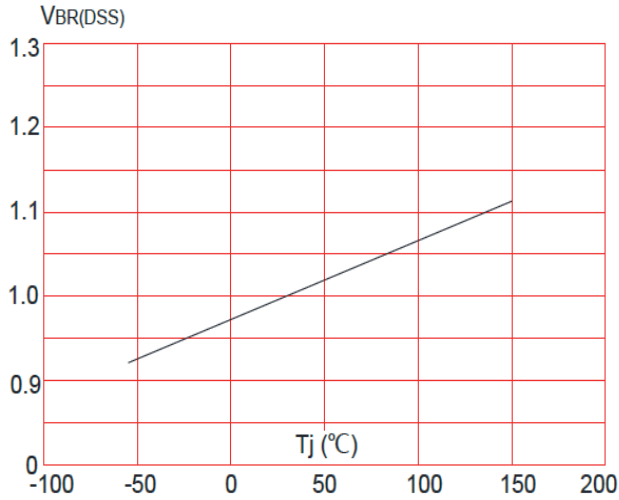


Figure 8: Normalized on Resistance vs. Junction Temperature

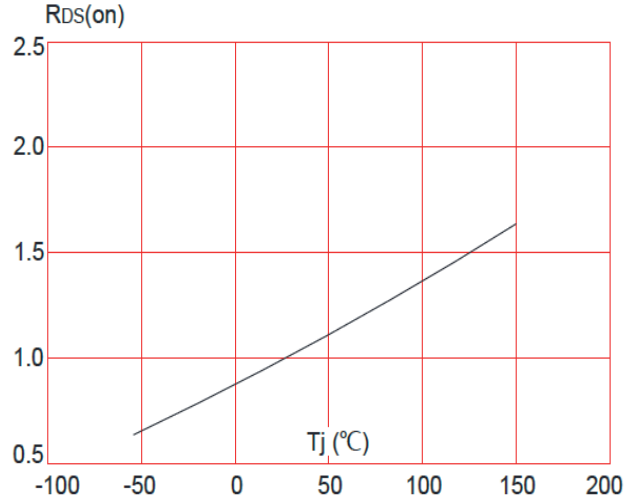


Figure 8: Maximum Safe Operating Area

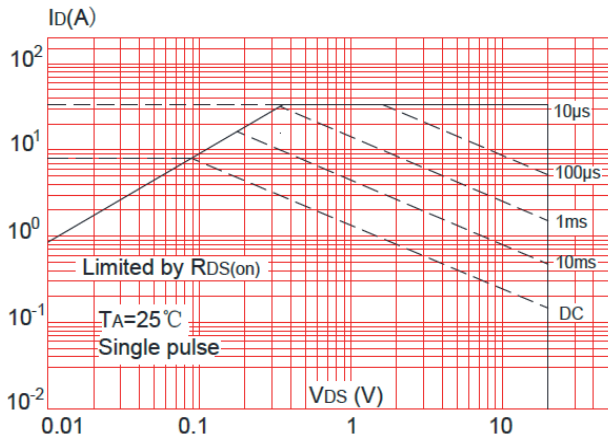


Figure 9: Maximum Continuous Drain Current vs. Ambient Temperature

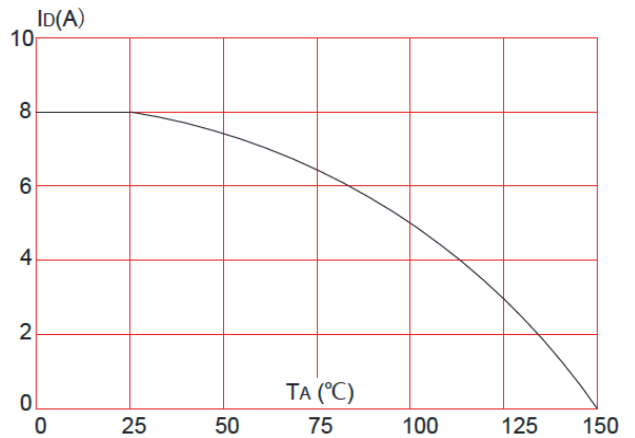
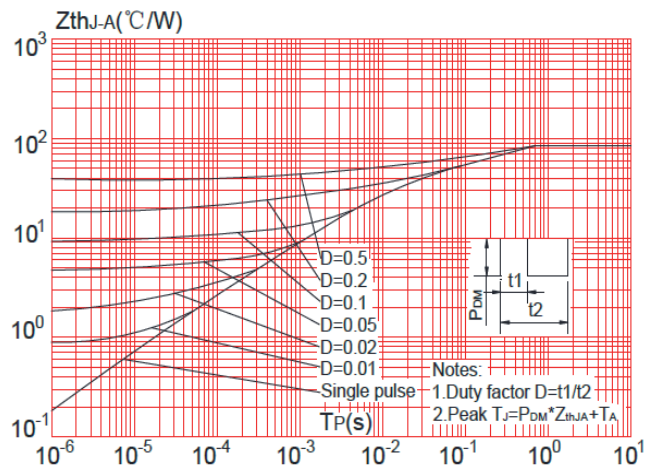
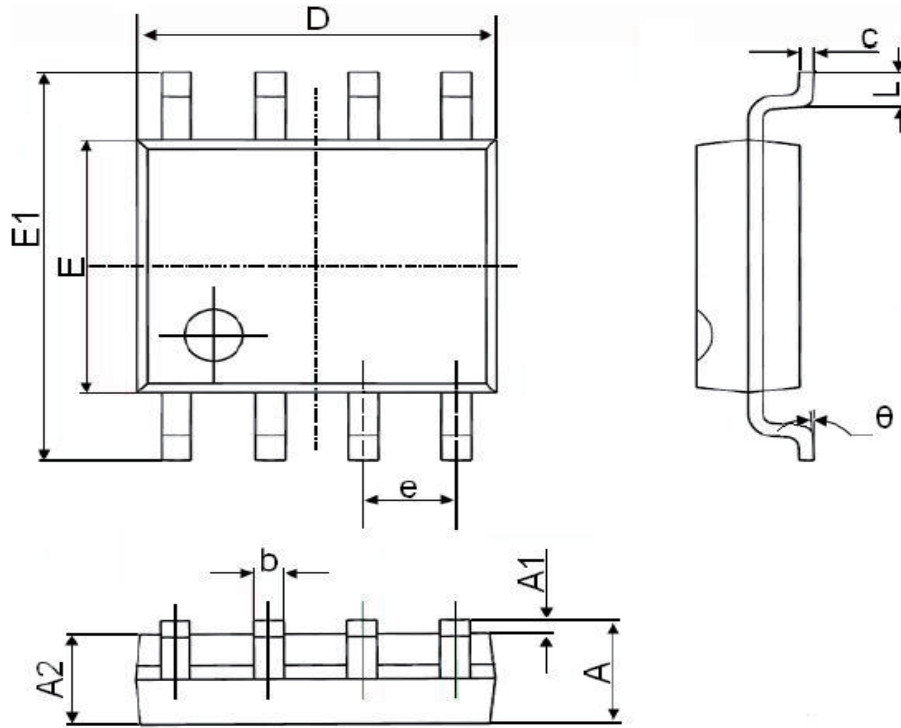


Figure 10: Maximum Effective Transient Thermal Impedance Junction to Ambient



SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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