

## 30V Full-Bridge of MOSFET

### Description

The PECN3002SR uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge . The complementary MOSFETs may be used to form a H-Bridge, and for a host of other applications.

### General Features

- ◆ **N-channel:**  
 $V_{DS} = 30V, I_D = 4A$   
 $R_{DS(ON)} = 23m\Omega$  (typical) @  $V_{GS} = 10V$   
 $R_{DS(ON)} = 26m\Omega$  (typical) @  $V_{GS} = 4.5V$
- ◆ **P-Channel:**  
 $V_{DS} = -30V, I_D = -3A$   
 $R_{DS(ON)} = 47m\Omega$  (typical) @  $V_{GS} = -10V$   
 $R_{DS(ON)} = 60m\Omega$  (typical) @  $V_{GS} = -4.5V$
- ◆ Excellent gate charge  $\times R_{DS(ON)}$  product(FOM)
- ◆ Very low on-resistance  $R_{DS(ON)}$
- ◆ 150 °C operating temperature
- ◆ Pb-free lead plating
- ◆ 100% UIS tested

### Application

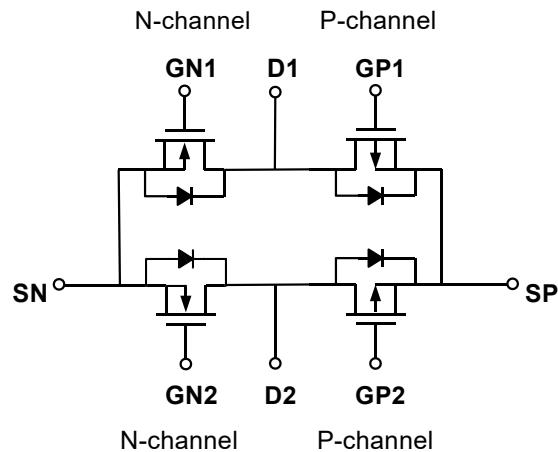
- ◆ Complementary MOSFET for DC FAN, Motor
- ◆ Wireless Charging
- ◆ H-Bridge Applications

### Package

◆ SOP-8 100% UIS TESTED!

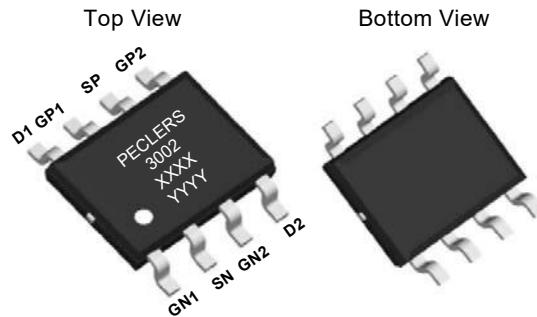
100%  $\Delta V_{ds}$  TESTED!

### Schematic diagram



### Marking and pin assignment

**SOP-8**



#### Note:

XXXX is the wafer lot number.

YYYY is the Quality Code



### Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN3002SR	-55°C to +150°C	SOP-8	4000

### Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Parameter	Symbol	Limit		Unit
		N	P	
Drain-source voltage	$V_{DS}$	30	-30	V
Gate-source voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Drain Current-Continuous (Silicon Limited)	$I_D$	4	-3	A
		3	-2.5	

Pulsed Drain Current (Package Limited)		I <sub>DM</sub>	12	-9	A
Power Dissipation	T <sub>A</sub> =25°C	P <sub>D</sub>	2	2	W
	T <sub>A</sub> =75°C		1.3	1.3	
Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55—150		°C

## Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient <sup>A</sup>	R <sub>θJA</sub>	33	40	°C/W
Maximum Junction-to-Ambient <sup>A</sup>		59	75	
Maximum Junction-to-Lead <sup>B</sup>	R <sub>θJC</sub>	16	24	

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The value in any given application depends on the user's specific board design. The current rating is based on the t ≤ 10s thermal resistance rating.

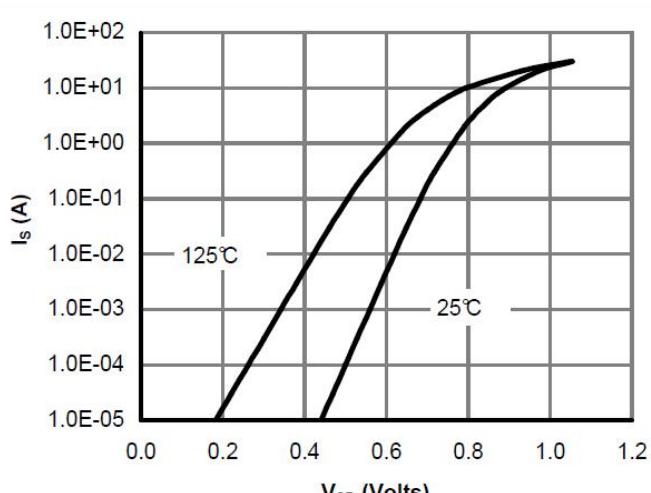
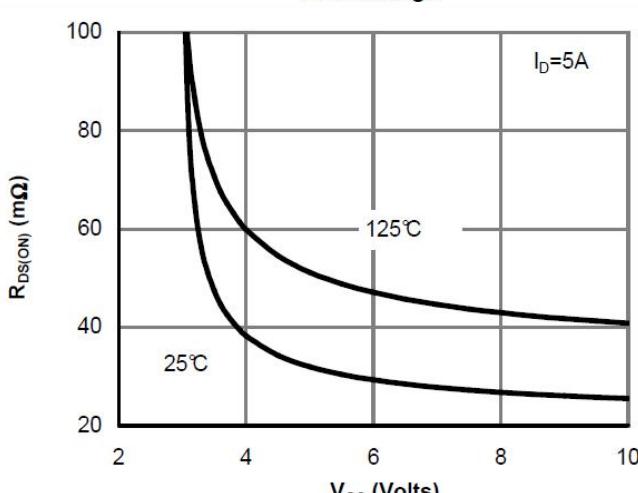
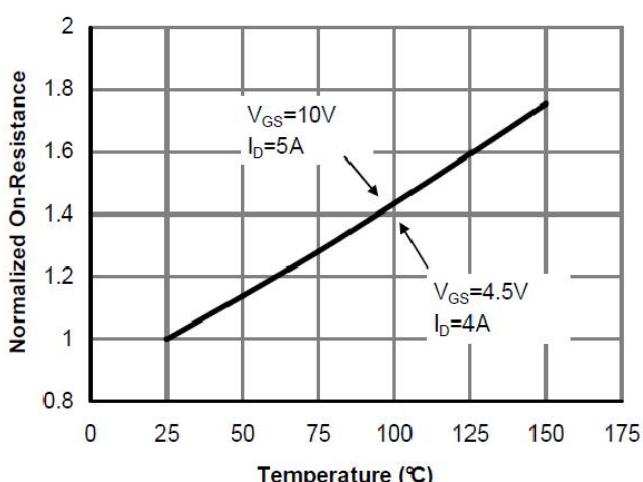
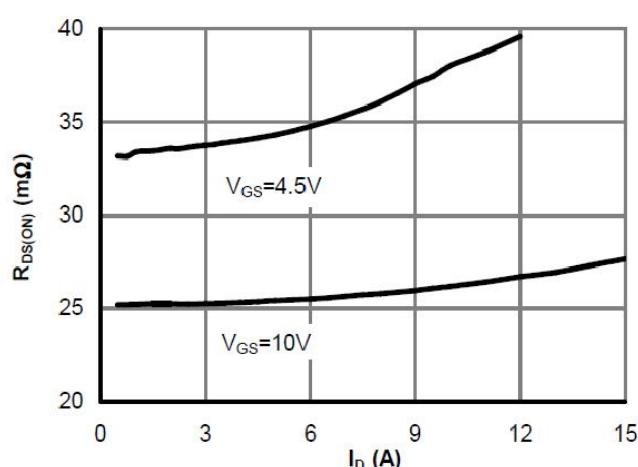
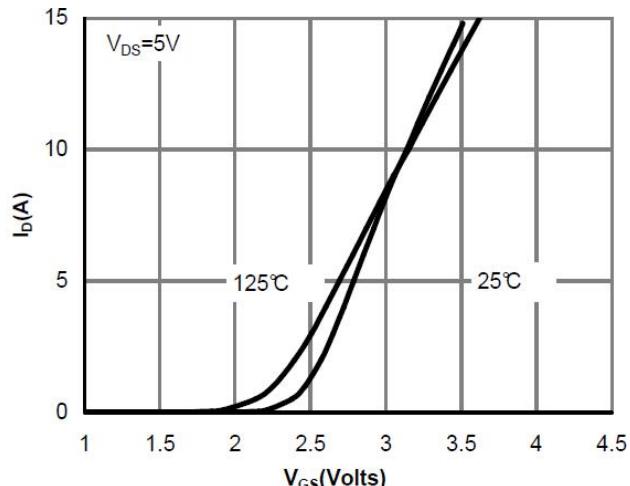
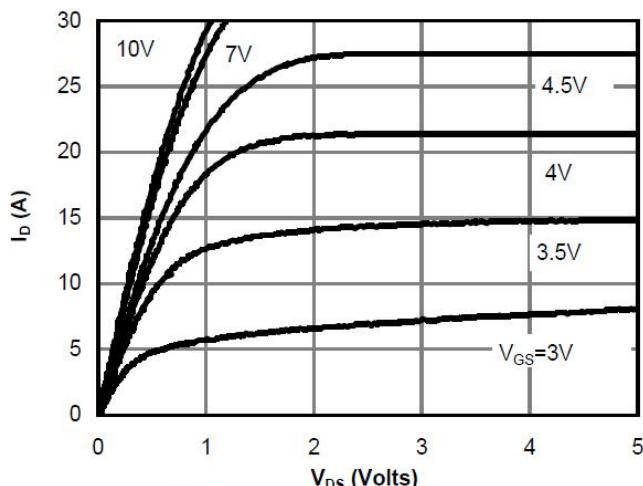
B: The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJC</sub> and lead to ambient.

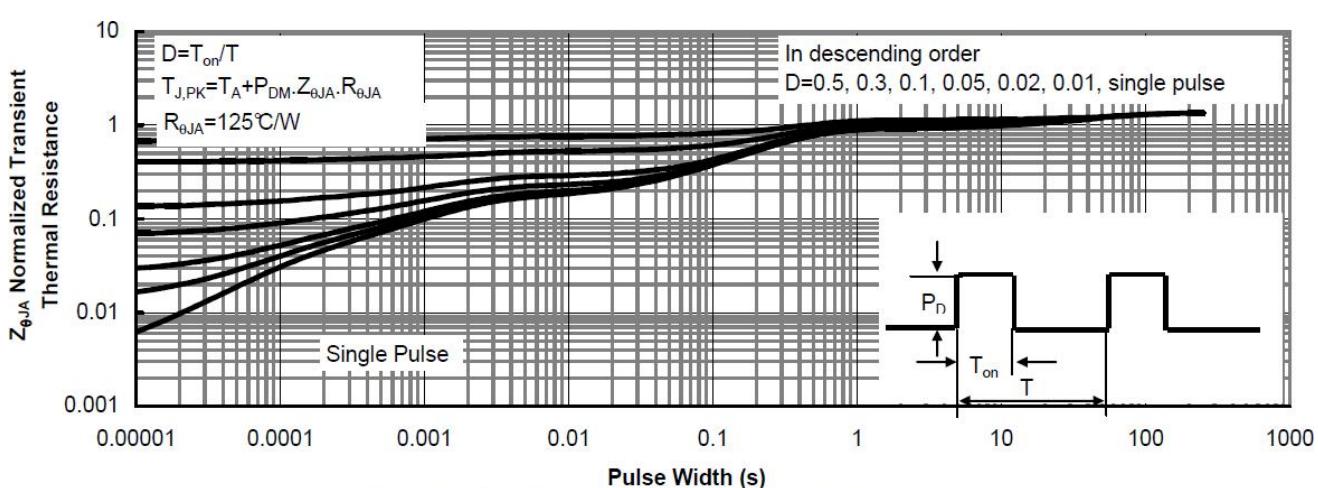
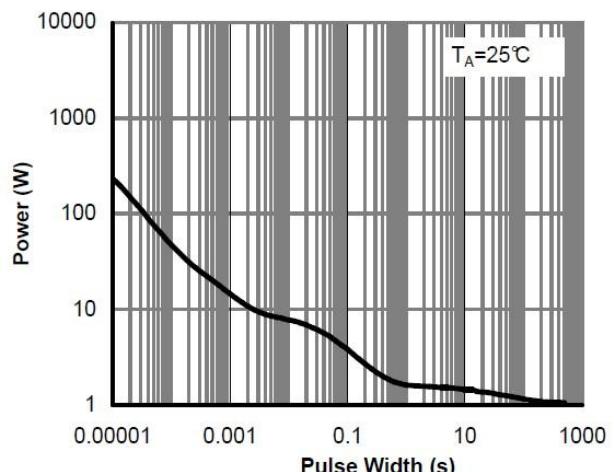
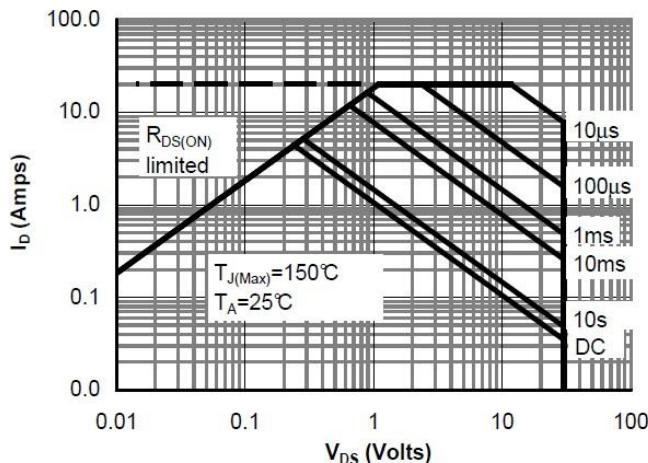
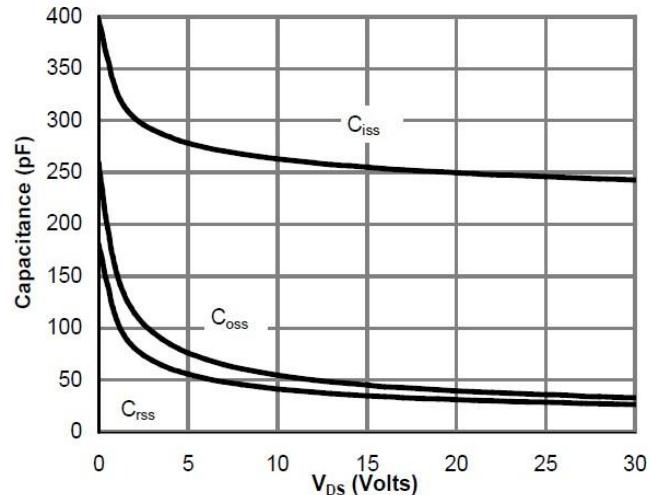
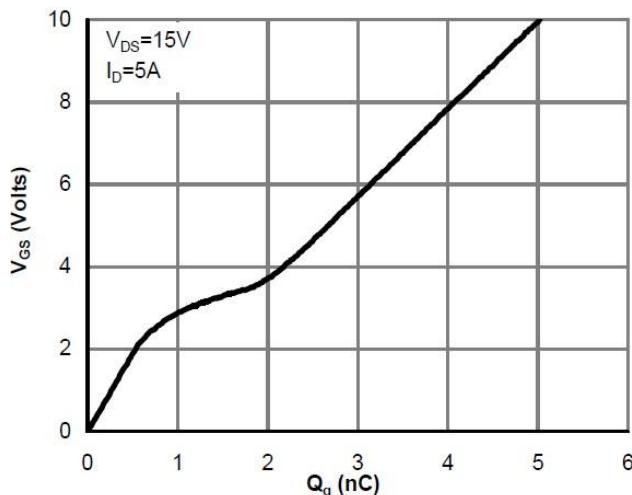
## N-Channel Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-body leakage	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	-	-	±100	nA
<b>ON Characteristics</b>						
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.7	1.35	2.0	V
Drain-source on-state resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =4A	-	23	28	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A		31	38	
Forward transconductance	G <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =4A	-	33	-	S
<b>Dynamic Characteristics</b>						
Input capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V f=1.0MHz	-	255	-	pF
Output capacitance	C <sub>OSS</sub>		-	45	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	35	-	
<b>Switching Characteristics</b>						
Turn-on delay time	t <sub>D(ON)</sub>	V <sub>DS</sub> =15V V <sub>GS</sub> =10V R <sub>L</sub> =2.6 ohm R <sub>GEN</sub> =3ohm	-	4.5	-	ns
Rise time	tr		-	2.5	-	
Turn-off delay time	t <sub>D(OFF)</sub>		-	14.5	-	
Fall time	tf		-	3.5	-	
Total gate charge	Qg	V <sub>DS</sub> =15V, I <sub>D</sub> =4A V <sub>GS</sub> =10V	-	5.2	-	nC
Gate-source charge	Qgs		-	0.85	-	
Gate-drain charge	Qgd		-	1.3	-	
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						

Diode forward voltage	$V_{SD}$	$V_{GS}=0V, I_s=1A$	-	0.76	1.16	V
-----------------------	----------	---------------------	---	------	------	---

### N-Channel: Typical Electrical And Thermal Characteristics





**P-Channel Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Drain-source breakdown voltage	$\text{BV}_{\text{DSS}}$	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=-250\mu\text{A}$	-30	-	-	V
Zero gate voltage drain current	$I_{\text{DSS}}$	$V_{\text{DS}}=-30\text{V}, V_{\text{GS}}=0\text{V}$	-	-	-1	$\mu\text{A}$
Gate-body leakage	$I_{\text{GSS}}$	$V_{\text{DS}}=0\text{V}, V_{\text{GS}}=\pm20\text{V}$	-	-	$\pm100$	nA
<b>ON Characteristics</b>						
Gate threshold voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=-250\mu\text{A}$	-0.9	-1.3	-2	V
Drain-source on-state resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}}=-10\text{V}, I_{\text{D}}=-43\text{A}$	-	47	60	$\text{m}\Omega$
		$V_{\text{GS}}=-4.5\text{V}, I_{\text{D}}=-2\text{A}$	-	60	85	
Forward transconductance	$G_{\text{FS}}$	$V_{\text{DS}}=-5\text{V}, I_{\text{D}}=-3\text{A}$	-	5	-	S
<b>Dynamic Characteristics</b>						
Input capacitance	$C_{\text{ISS}}$	$V_{\text{DS}}=-10\text{V}, V_{\text{GS}}=0\text{V}$ $f=1.0\text{MHz}$	-	600	-	$\text{pF}$
Output capacitance	$C_{\text{OSS}}$		-	85	-	
Reverse transfer capacitance	$C_{\text{RSS}}$		-	65	-	
Gate resistance	$R_{\text{g}}$	$V_{\text{DS}}=15\text{mV}, f=1.0\text{MHz}$		10		$\Omega$
<b>Switching Characteristics</b>						
Turn-on delay time	$t_{\text{D}(\text{ON})}$	$V_{\text{DD}}=-15\text{V}$ $I_{\text{D}}=-4.2\text{A}$ $V_{\text{GEN}}=-10\text{V}$ $R_{\text{L}}=10\text{ohm}$ $R_{\text{GEN}}=6\text{ohm}$	-	3.0	3.5	ns
Rise time	$t_{\text{r}}$		-	31	35	
Turn-off delay time	$t_{\text{D}(\text{OFF})}$		-	33	40	
Fall time	$t_{\text{f}}$		-	8	12	
Total gate charge	$Q_{\text{g}}$	$V_{\text{DS}}=-15\text{V}, I_{\text{D}}=-3\text{A}$ $V_{\text{GS}}=-4.5\text{V}$	-	6.2	-	nC
Gate-source charge	$Q_{\text{gs}}$		-	1.7	-	
Gate-drain charge	$Q_{\text{gd}}$		-	2.5	-	
Body Diode Reverse Recovery Time	$t_{\text{rr}}$	$I_{\text{F}}=-3\text{A}, dI/dt=100\text{A/ms}$		24		nS
Body Diode Reverse Recovery Charge	$Q_{\text{rr}}$	$I_{\text{F}}=-3\text{A}, dI/dt=100\text{A/ms}$		1.8		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Diode forward voltage	$V_{\text{SD}}$	$V_{\text{GS}}=0\text{V}, I_{\text{s}}=-1\text{A}$	-	-0.81	-1.2	V

### P-Channel: Typical Electrical And Thermal Characteristics

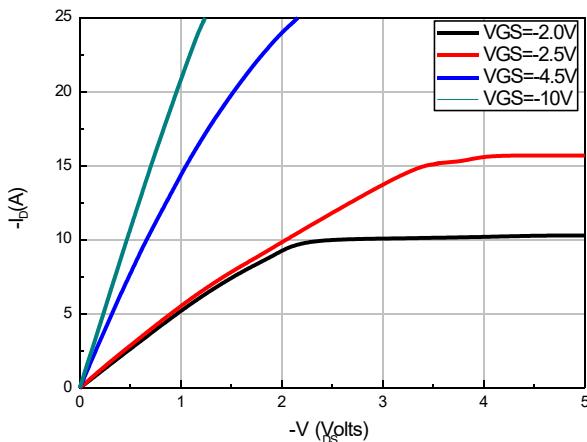


Fig 1: On-Region Characteristics

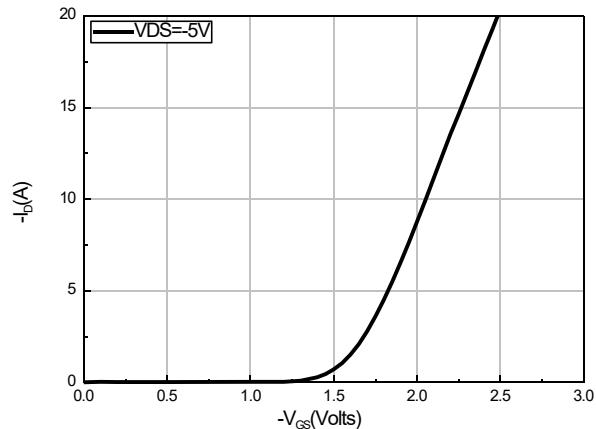


Fig 2: Transfer Characteristics

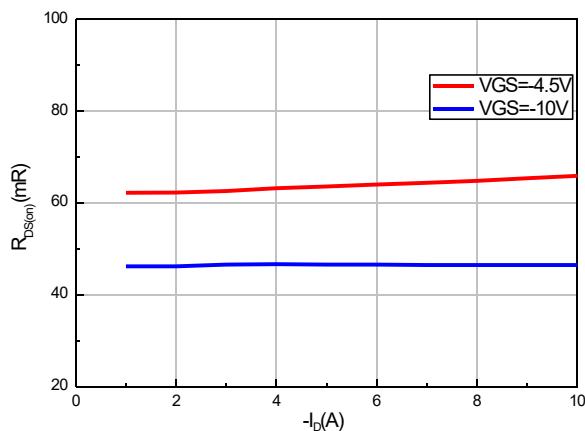


Fig 3: On-Resistance vs. Drain Current and Gate Voltage

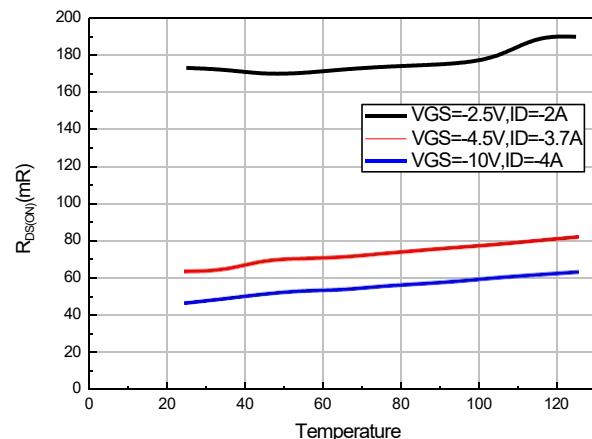


Fig 4: On-Resistance vs. Junction Temperature

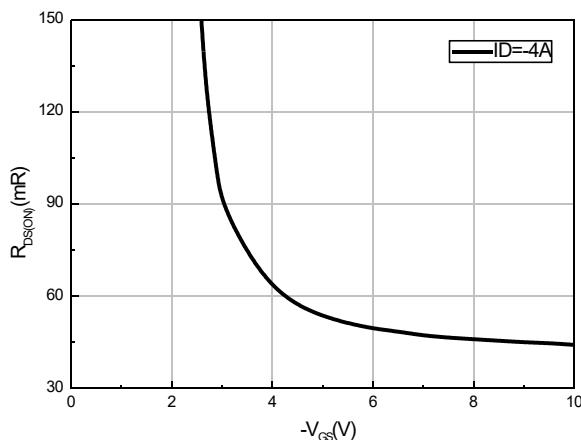


Fig 5: On-Resistance vs. Gate-Source Voltage

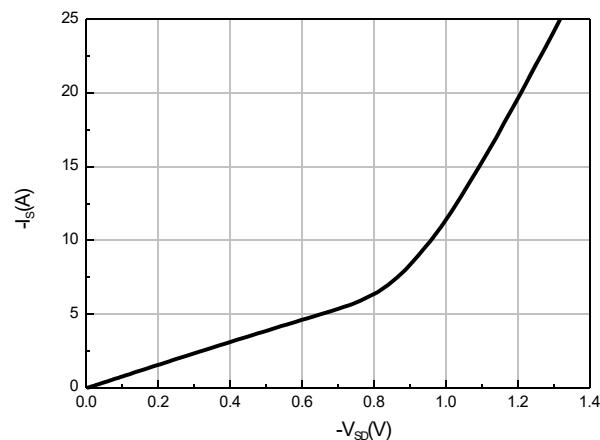
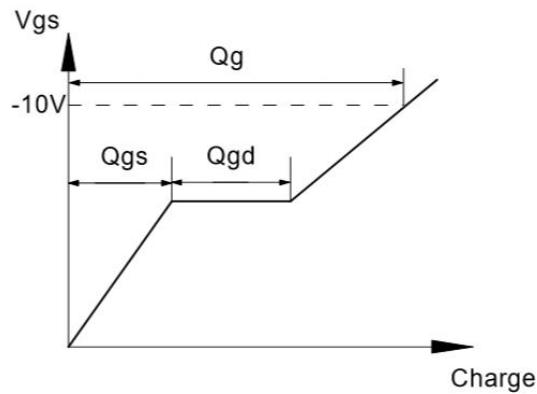
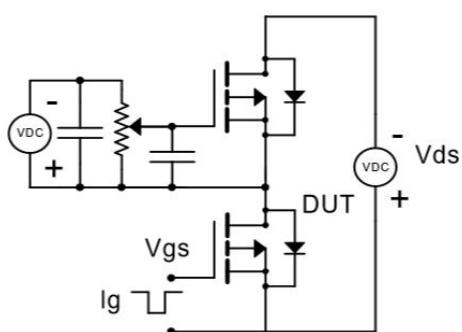
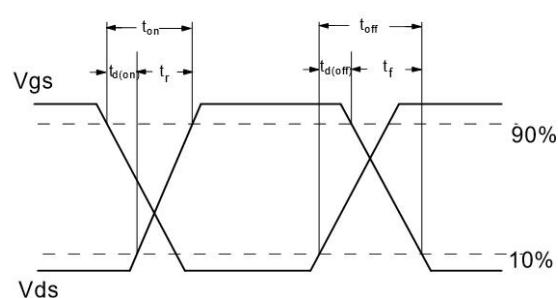
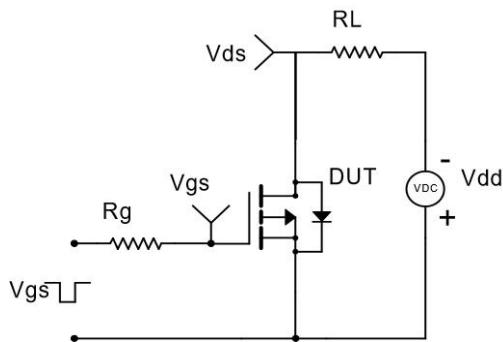


Fig 6: Body-Diode Characteristics

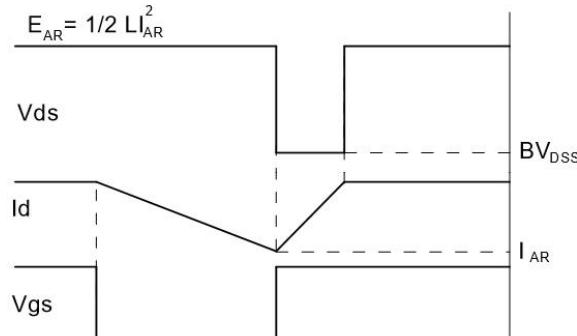
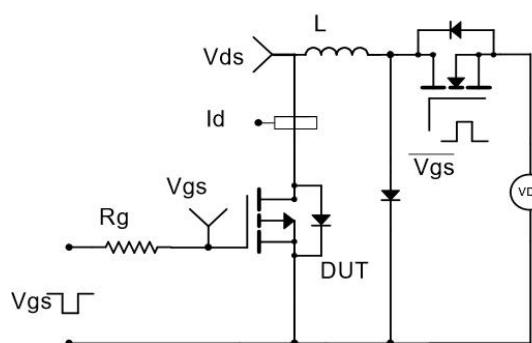
Gate Charge Test Circuit & Waveform



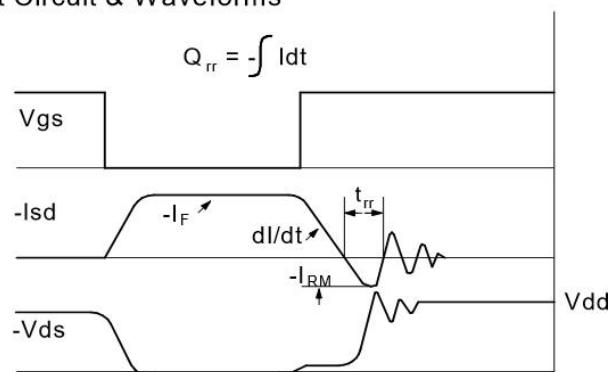
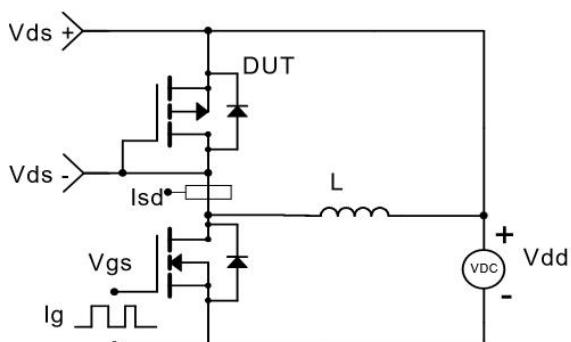
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

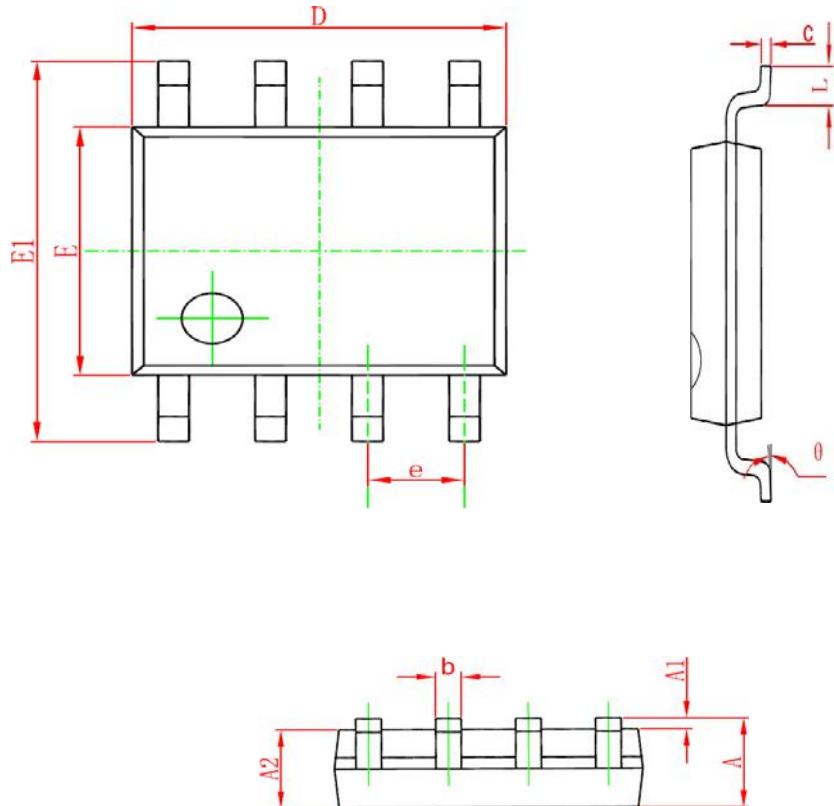


Diode Recovery Test Circuit & Waveforms



## Package Information

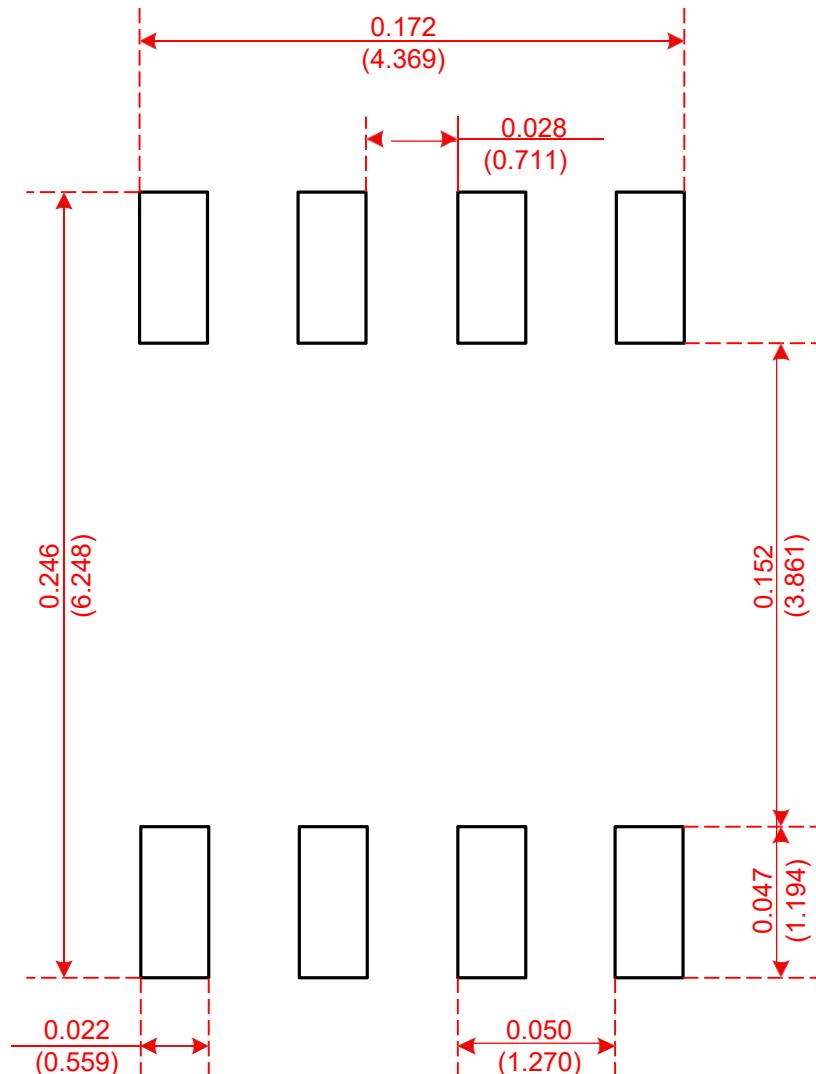
- SOP-8



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°

### Recommended Minimum Pads

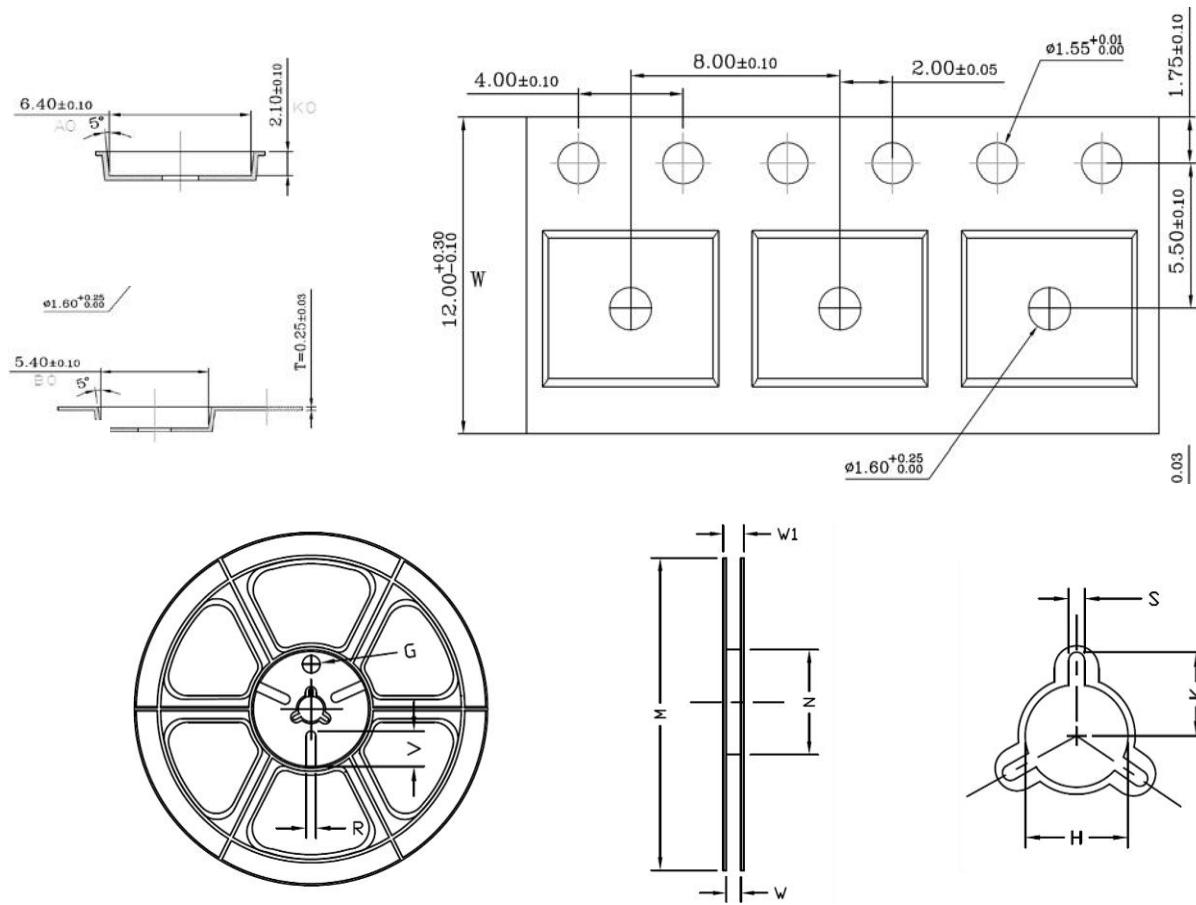
- SOP-8



**Recommended Minimum Pads**  
Dimensions in Inches/(mm)

### Tape and Reel

- SOP-8



Tape Size	Reel Size	M	N	W	W1	H	K	S	G	R	V
12mm	Ø330	Ø330.00 ±0.50	Ø97.00 ±0.30	13.00 ±0.30	17.40 ±1.00	Ø13.00 ±0.5	10.6	2.00 ±0.50	—	—	—

