

**N-Ch and P-Ch Power MOSFET**

**GENERAL DESCRIPTION**

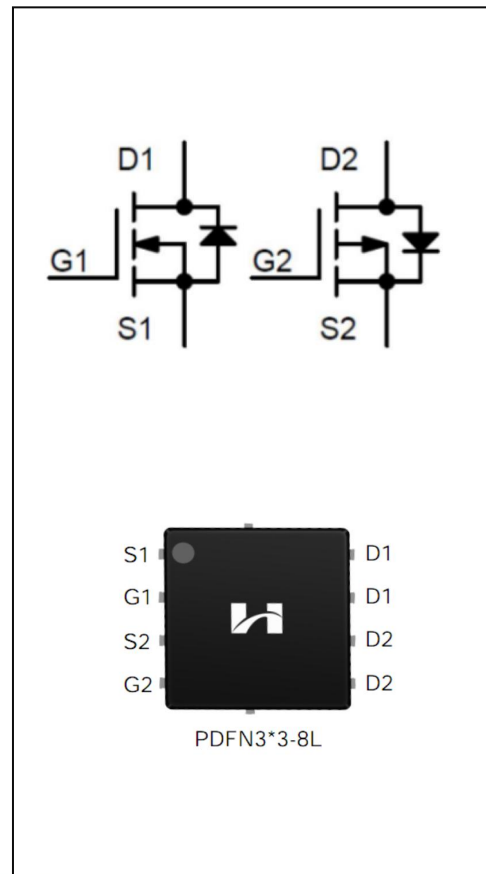
Complementary Enhancement MOSFET in a PDFN-3\*3-8L Package. The SFN0315T4 uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge can be used in a wide variety of applications.

**Features**

- ◆ N-CHANNEL
  - $V_{DS}=30V, I_D=15A$
  - $R_{DS(on)(TYP)}=8.8m\Omega; (V_{GS}=10V, I_D=10A)$
  - $R_{DS(on)(TYP)}=12.5m\Omega; (V_{GS}=4.5V, I_D=5A)$
- )◆ P-CHANNEL
  - $V_{DS}=-30V, I_D=-15A$
  - $R_{DS(on)(TYP)}=24.0m\Omega; (V_{GS}=-10V, I_D=-10A)$
  - $R_{DS(on)(TYP)}=36.0m\Omega; (V_{GS}=-4.5V, I_D=-5A)$

**Applications**

- ◆ Power faction correction (PFC)
- ◆ Switched mode power supplies (SMPS)
- ◆ Uninterruptible power supply (UPS)
- ◆ LED lighting power



**ORDERING INFORMATION**

Part No.	Package	Marking	Material	Packing
SFN0315T4	PDFN3*3-8L	SFN0315T4	Pb Free	Reel

## ABSOLUTE MAXIMUM RATINGS (T<sub>J</sub>=25°C unless otherwise noted)

Characteristics		Symbol	N-CHANNEL	P-CHANNEL	Unit
Drain-Source Voltage		V <sub>DS</sub>	30	-30	V
Gate-Source Voltage		V <sub>GS</sub>	±20	±20	
Drain Current	T <sub>C</sub> = 25°C	I <sub>D</sub>	15	-15	A
	T <sub>C</sub> = 100°C		12.5	10.1	
Drain Current Pulsed(Note 1)		I <sub>DM</sub>	72	60	
Power Dissipation(T <sub>C</sub> =25°C)		P <sub>D</sub>	18		W
Single Pulsed Avalanche Energy (Note 2)		E <sub>AS</sub>	85	72	mJ
Operation Junction Temperature Range		T <sub>J</sub>	-55 to +150		°C
Storage Temperature Range		T <sub>stg</sub>	-55 to +150		
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300		

## THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	7.36	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	60	

## N-Ch ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B <sub>VDS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	--	--	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	--	--	1	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =20V, V <sub>DS</sub> =0V	--	--	100	nA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V	--	--	-100	
On Characteristics						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> =250μA	1	1.5	2	V
Static Drain- Source On State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10 V, I <sub>D</sub> =10A	--	8.8	12.5	mΩ
		V <sub>GS</sub> =4.5 V, I <sub>D</sub> =5A	--	12.5	16.5	
Dynamic Characteristics						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V	--	875	--	pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> =0V	--	145	--	
Reverse Transfer Capacitance	C <sub>rss</sub>	f=1.0MHZ	--	109	--	
Switching Characteristics						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, V <sub>GS</sub> =10V R <sub>G</sub> =6Ω, I <sub>D</sub> =10A (Note 3.4)	--	5.8	--	nS
Turn-on Rise Time	t <sub>r</sub>		--	30.6	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	38.2	--	
Turn-off Fall Time	t <sub>f</sub>		--	15.1	--	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =10A V <sub>GS</sub> =10V (Note 3.4)	--	18.5	--	nC
Gate-Source Charge	Q <sub>gs</sub>		--	6.6	--	
Gate-Drain Charge	Q <sub>gd</sub>		--	4.3	--	

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	$I_S$	Integral Reverse P-N Junction Diode in the MOSFET	--	--	18	A
Pulsed Source Current	$I_{SM}$		--	--	72	
Diode Forward Voltage	$V_{SD}$	$I_S=10A, V_{GS}=0V$	--	0.76	1.2	V

**NOTE:**

- 1.Pulse width limited by maximum junction temperature
- 2.L=0.5mH,  $V_{DD}=15V, V_G=10V, R_G=25\Omega$ , starting  $T_J=25^\circ C$
- 3.Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
- 4.Essentially independent of operating temperature

**P-Ch ELECTRICAL CHARACTERISTICS**

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain -Source Breakdown Voltage	$B_{VDSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	--	--	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-30V, V_{GS}=0V$	--	--	-1	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=20V, V_{DS}=0V$	--	--	100	nA
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=-20V, V_{DS}=0V$	--	--	-100	
<b>On Characteristics</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	-1.5	-2.0	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-10A$	--	24.0	36.0	$m\Omega$
		$V_{GS}=-4.5V, I_D=-5A$	--	34.0	40.0	
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-15V$ $V_{GS}=0V$ $f=1.0MHz$	--	1370	--	pF
Output Capacitance	$C_{oss}$		--	386	--	
Reverse Transfer Capacitance	$C_{rss}$		--	140	--	
<b>Switching Characteristics</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-10V, V_{GS}=-10V$ $R_G=6.0\Omega, I_D=-10A$ (Note 1.2)	--	7.1	--	nS
Turn-on Rise Time	$t_r$		--	16.5	--	
Turn-off Delay Time	$t_{d(off)}$		--	19.8	--	
Turn-off Fall Time	$t_f$		--	8.6	--	
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-10A$ $V_{GS}=-10V$ (Note 1.2)	--	15.3	--	nC
Gate-Source Charge	$Q_{gs}$		--	3.6	--	
Gate-Drain Charge	$Q_{gd}$		--	5.9	--	

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	$I_S$	Integral Reverse P-N Junction Diode in the MOSFET	--	--	-15	A
Pulsed Source Current	$I_{SM}$		--	--	-60	
Diode Forward Voltage	$V_{SD}$	$I_S = -10A, V_{GS} = 0V$	--	-0.97	-1.2	V

## NOTE:

1. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
2. Essentially independent of operating temperature

N-Channel Typical Performance Characteristics

Figure 1. Output Characteristics

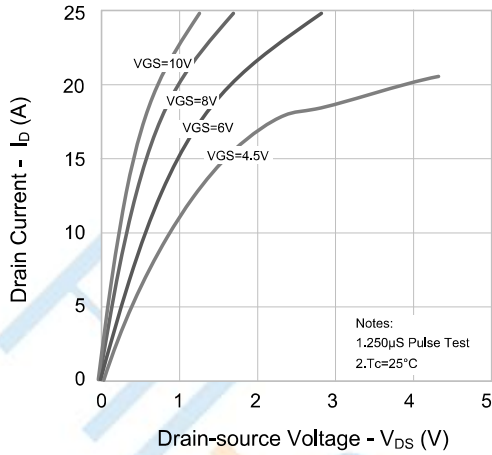


Figure 2. Transfer Characteristics

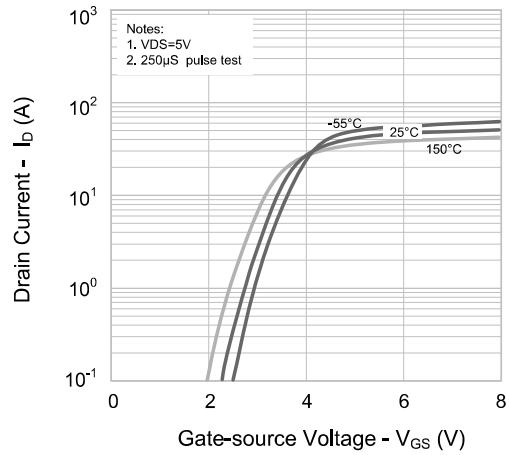


Figure 3. On-resistance vs. Drain Current

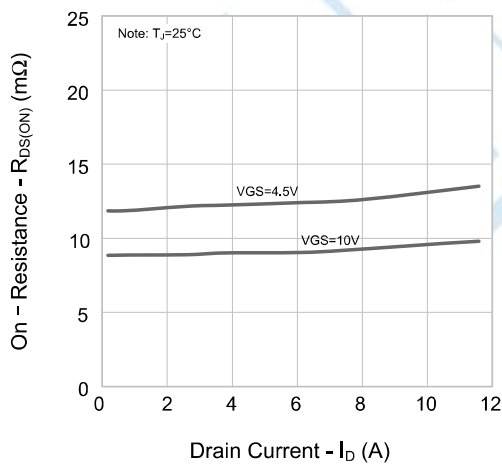


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

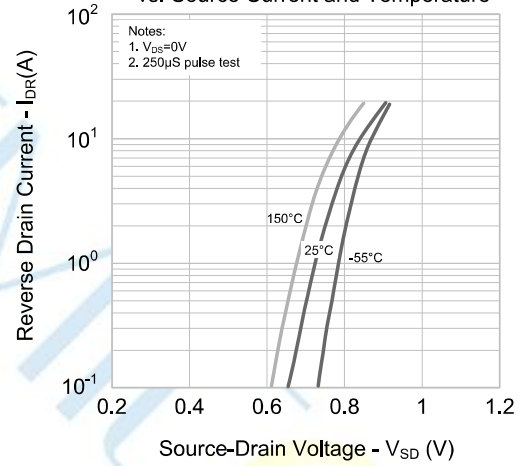


Figure 5. Capacitance Characteristics

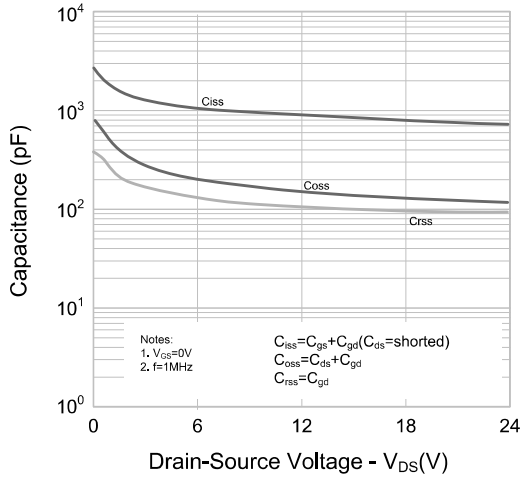
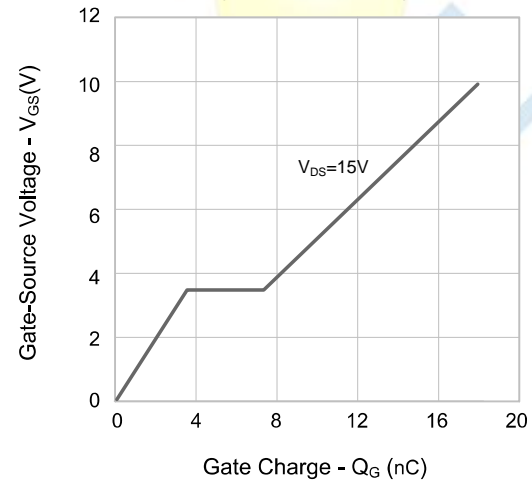


Figure 6. Gate Charge



P-Channel Typical Performance Characteristics

Figure 1. Output Characteristics

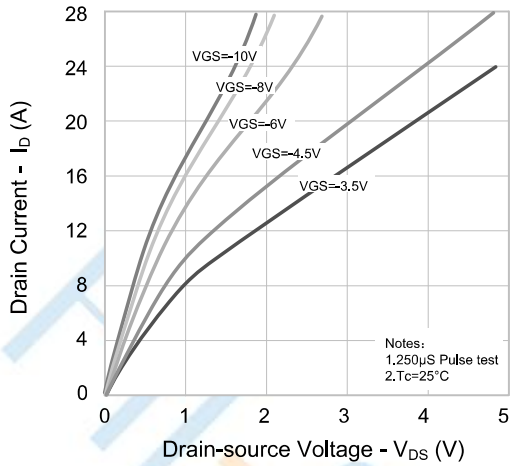


Figure 2. Transfer Characteristics

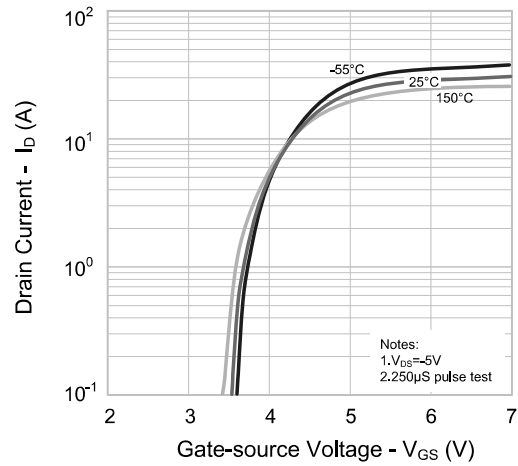


Figure 3. On-Resistance vs. Drain Current

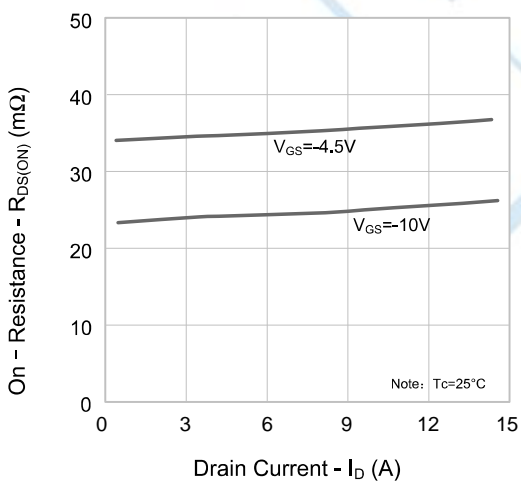


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

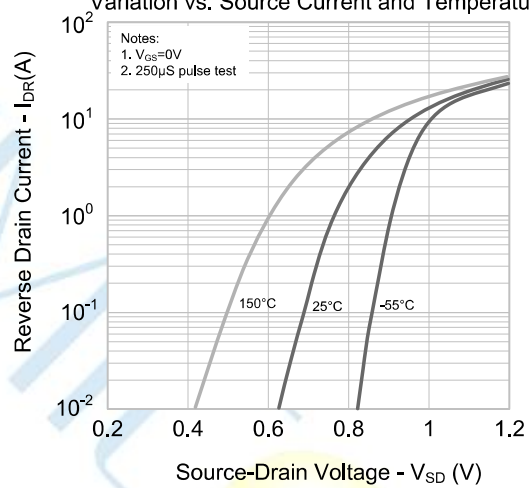


Figure 5. Capacitance Characteristics

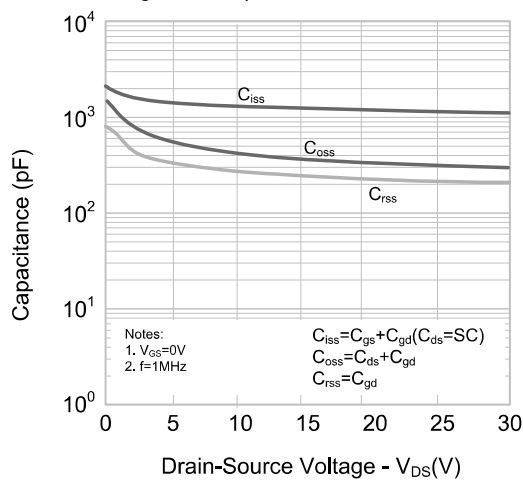
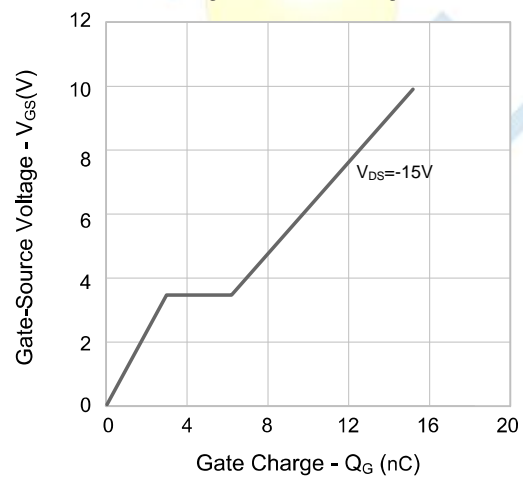
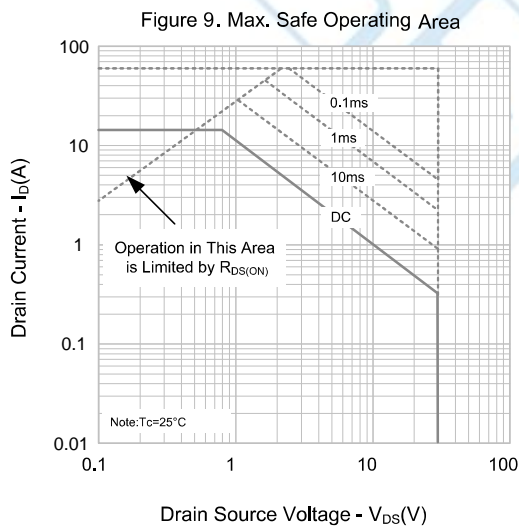
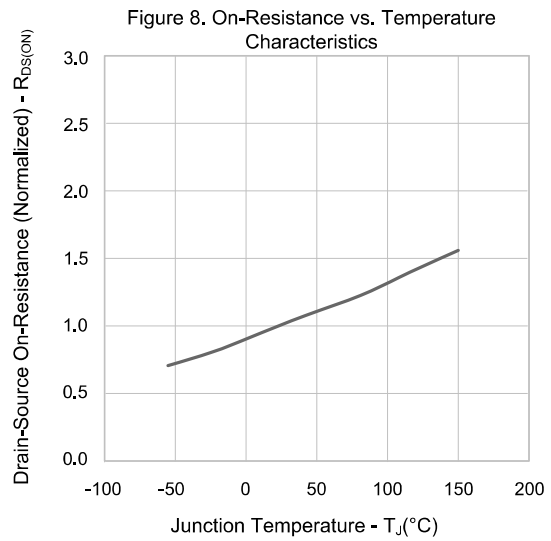
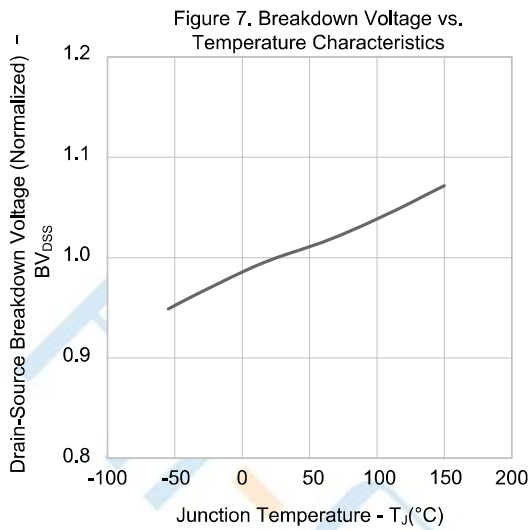


Figure 6. Gate Charge

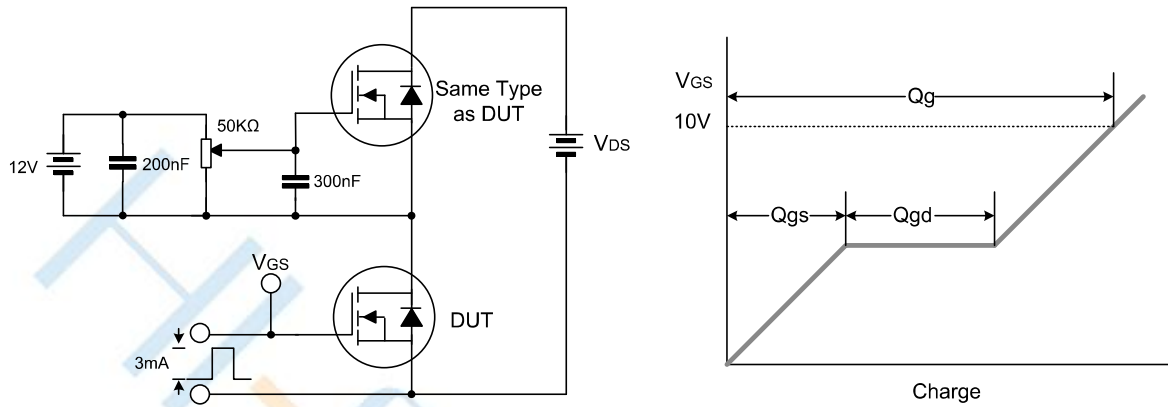


Typical Performance Characteristics

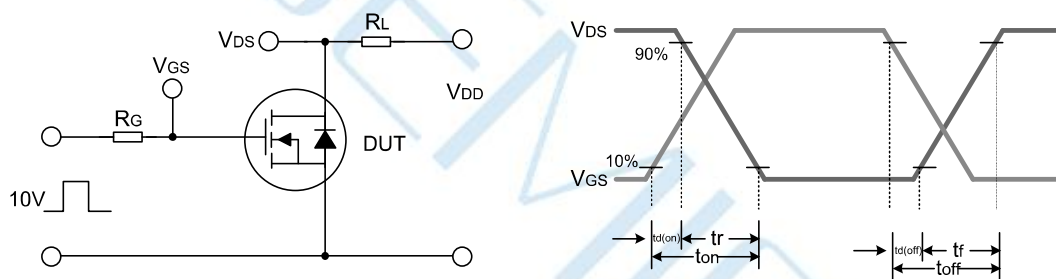


Test Circuit

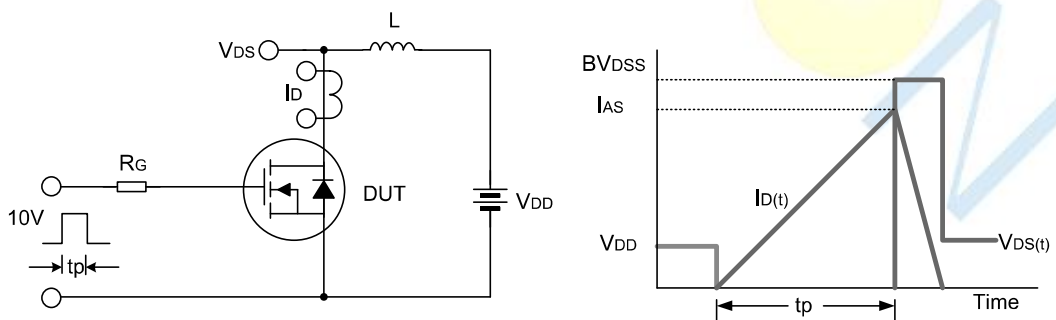
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



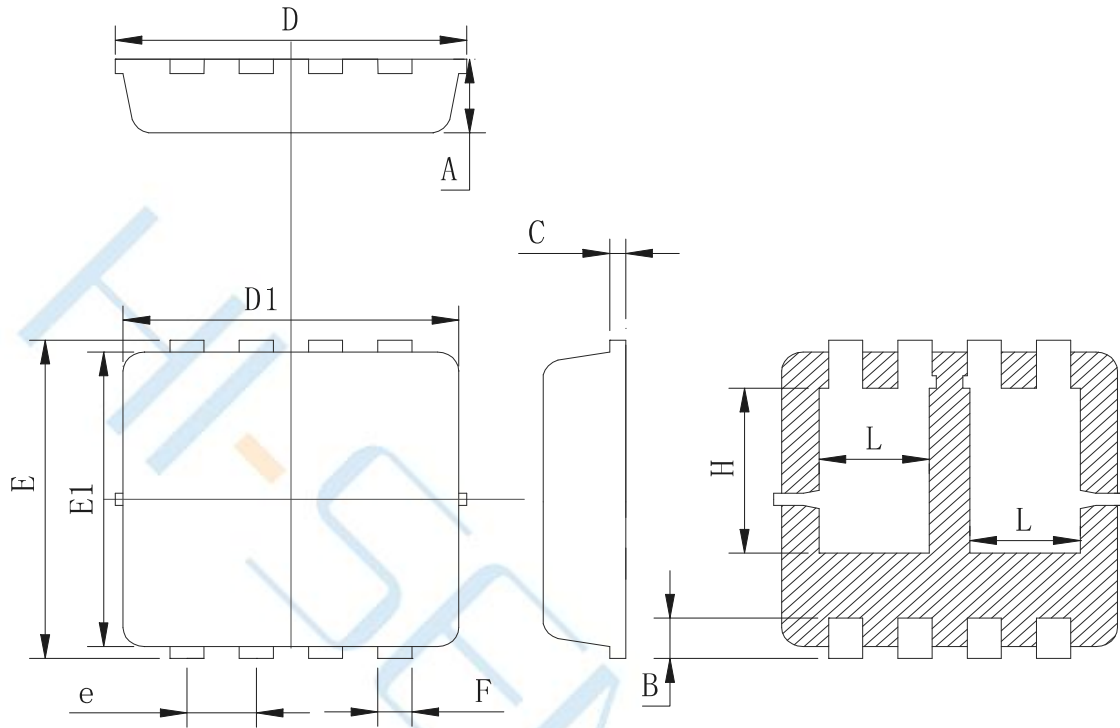
Unclamped Inductive Switching Test Circuit & Waveform





Package Dimensions of PDFN3\*3-8L

Unit:mm



Symbol	Min	Typ	Max
A	0.725	0.775	0.825
B	0.28	0.38	0.48
C	0.13	0.15	0.20
D	3.20	3.30	3.35
D1	3.05	3.15	3.25
E	3.25	3.35	3.45
E1	3.0	3.1	3.2
e	0.60	0.65	0.70
F	0.27	0.32	0.37
H	1.63	1.73	1.83
L	0.93	1.03	1.13

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