

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

**GENERAL DESCRIPTION**

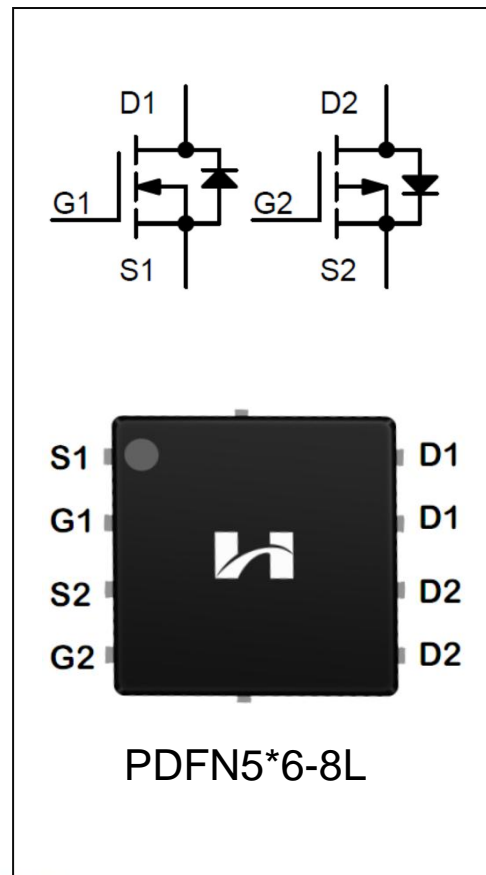
Complementary Enhancement MOSFET in a PDFN5\*6 Package. The SFM0318T4 uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge can be used in a wide variety of applications.

**Features**

- ◆ N-CHANNEL  
 $V_{DS}=30V, I_D=23A$   
 $R_{DS(on)(TYP)}=15m\ \Omega ; (V_{GS}=10V)$   
 $R_{DS(on)(TYP)}=20m\ \Omega ; (V_{GS}=4.5V)$
- ◆ P-CHANNEL  
 $V_{DS}=-30V, I_D=-18A$   
 $R_{DS(on)(TYP)}=24m\ \Omega ; (V_{GS}=-10V)$   
 $R_{DS(on)(TYP)}=35m\ \Omega ; (V_{GS}=-4.5V)$

**Applications**

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



**ORDERING INFORMATION**

Part No.	Package	Marking	Material	Packing
SFM0318T4	PDFN 5*6-8L	SFM0318T4	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	V
Drain Current	T <sub>C</sub> = 25°C	I <sub>D</sub>	23	-18	A
	T <sub>C</sub> = 100°C		14	-12	
Drain Current Pulsed(Note 1)		I <sub>DM</sub>	40	-36	A
Power Dissipation(T <sub>C</sub> =25°C)		P <sub>D</sub>	3.6		W
Operation Junction Temperature Range		T <sub>J</sub>	-55 to +150		°C
Storage Temperature Range		T <sub>stg</sub>	-55 to +150		°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300		°C

## THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	34	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	180	°C/W

## N-Ch ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain -Source Breakdown Voltage	$V_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	33	--	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	1.5	2.0	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=8A$	--	15	20	$m\Omega$
		$V_{GS}=4.5V, I_D=5A$	--	20	27	$m\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=10V, I_D=5A$		6.5		S
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=15V$	--	850	--	pF
Output Capacitance	$C_{oss}$	$V_{GS}=0V$	--	65	--	
Reverse Transfer Capacitance	$C_{rss}$	$f=1.0MHz$	--	58	--	pF
<b>Switching Characteristics</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V; V_{GS}=10V$ $R_G=3.3\Omega, I_D=3A$ (Note 2.3)	--	5.1	--	nS
Turn-on Rise Time	$t_r$		--	3.2	--	
Turn-off Delay Time	$t_{d(off)}$		--	13.5	--	
Turn-off Fall Time	$t_f$		--	3.7	--	
Total Gate Charge	$Q_g$	$V_{DS}=15V, I_D=3A$ $V_{GS}=10V$ (Note 2.3)	--	15.5	--	nC
Gate-Source Charge	$Q_{gs}$		--	2.3	--	
Gate-Drain Charge	$Q_{gd}$		--	3.5	--	

## 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	--	--	20	A
Pulsed Source Current	$I_{SM}$		--	--	40	
Diode Forward Voltage	$V_{SD}$	$I_S=20A, V_{GS}=0V$	--	0.81	1.2	V

### NOTE:

- 1.Pulse width limited by maximum junction temperature
- 2.Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
- 3.Essentially independent of operating temperature

## P-Ch ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
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	
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1	-1.5	-2.5	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-8A$	--	24	30	$m\Omega$
		$V_{GS}=-4.5V, I_D=-5A$	--	35	43	$m\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-10A$		11		S
Dynamic Characteristics						
Input Capacitance	$C_{iss}$	$V_{DS}=-15V$	--	860	--	pF
Output Capacitance	$C_{oss}$	$V_{GS}=0V$	--	390	--	
Reverse Transfer Capacitance	$C_{rss}$	$f=1.0MHz$	--	180	--	
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V; V_{GS}=-10V$ $R_G=3.0\Omega, I_D=-15A$ (Note 2.3)	--	6.9	--	nS
Turn-on Rise Time	$t_r$		--	18	--	
Turn-off Delay Time	$t_{d(off)}$		--	21	--	
Turn-off Fall Time	$t_f$		--	8.5	--	
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-15A$ $V_{GS}=-10V$ (Note 2.3)	--	16.6	--	nC
Gate-Source Charge	$Q_{gs}$		--	3.8	--	
Gate-Drain Charge	$Q_{gd}$		--	6.6	--	

## 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	$I_{SM}$		--	--	-36	
Diode Forward Voltage	$V_{SD}$	$I_S=-15A, V_{GS}=0V$	--	-0.85	-1.4	V

### NOTE:

- 1.Pulse width limited by maximum junction temperature
- 2.Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
- 3.Essentially independent of operating temperature

N-Channel Typical Performance Characteristics

Figure 1. Output Characteristics

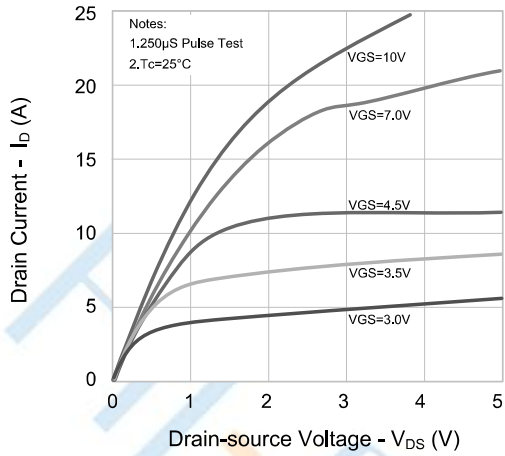


Figure 2. Transfer Characteristics

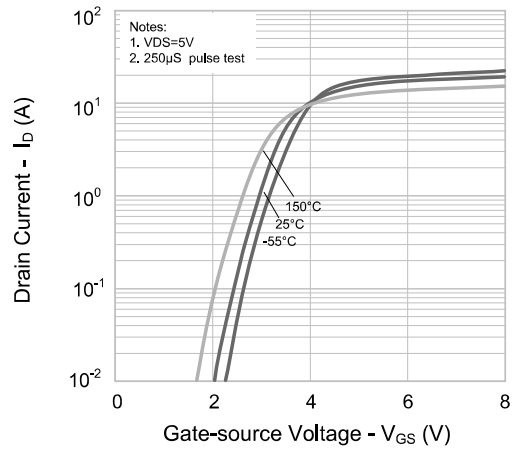


Figure 3. On-resistance vs. Drain Current

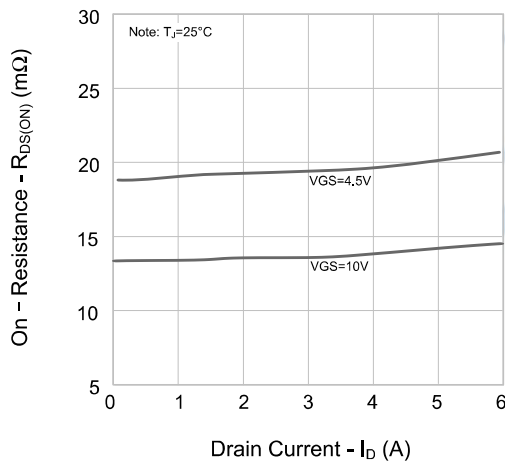


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

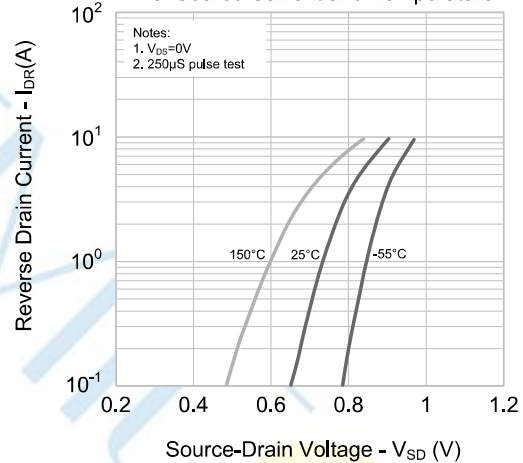


Figure 5. Capacitance Characteristics

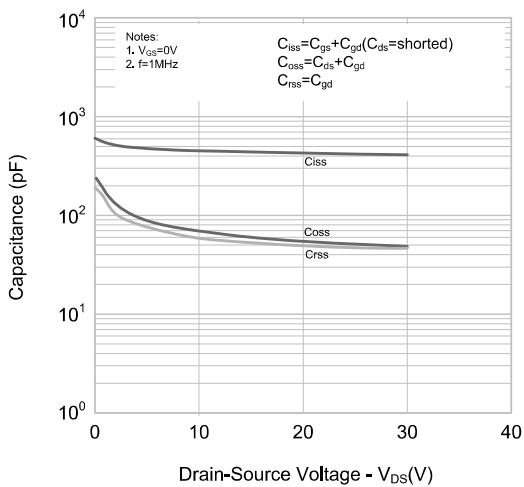
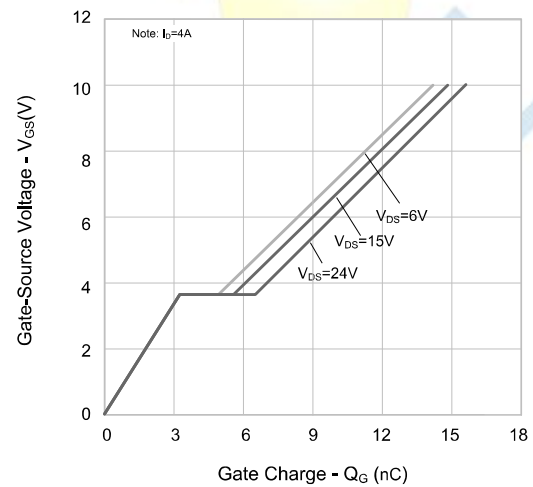


Figure 6. Gate Charge



P-Channel Typical Performance Characteristics

Figure 1. On-Region Characteristics

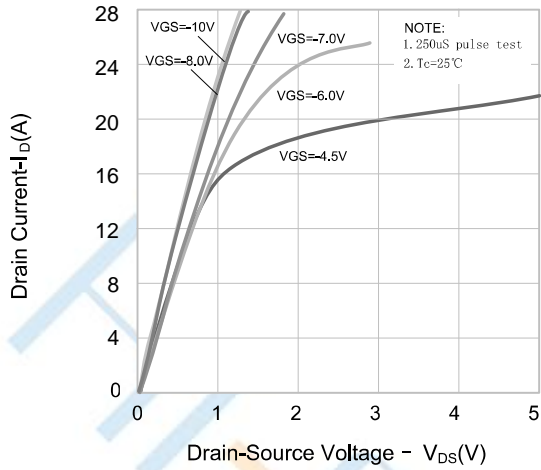


Figure 2. Transfer Characteristics

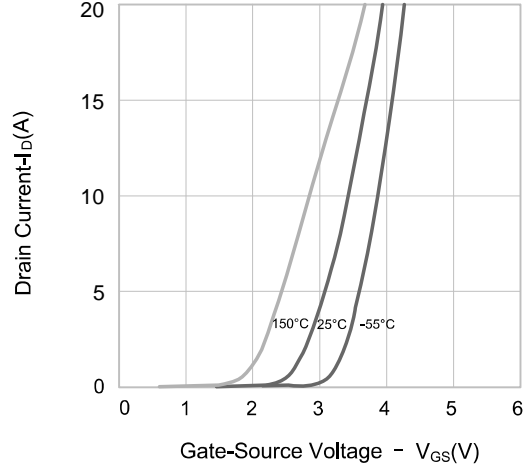


Figure 3. On-Resistance Variation vs. Drain-Current, Gate Voltage

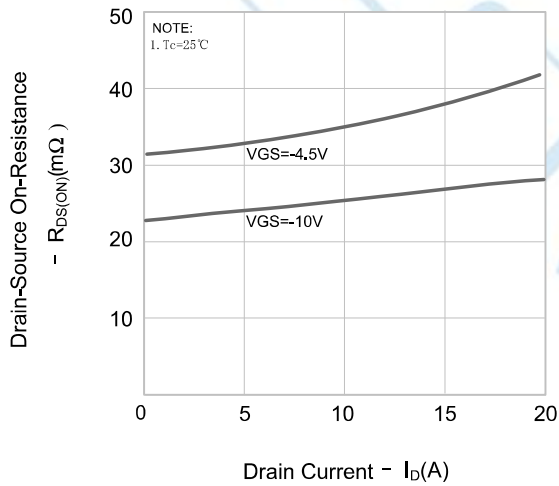


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

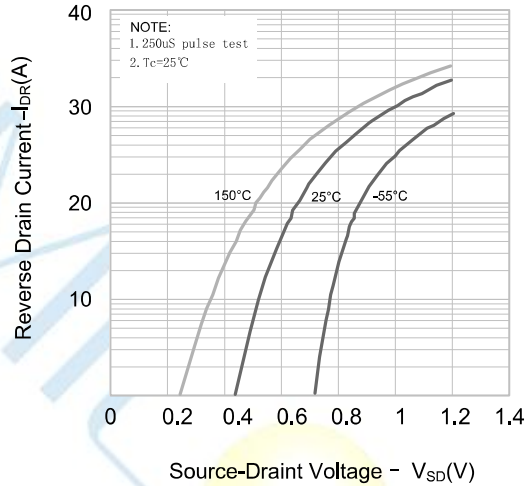


Figure 5. Capacitance Characteristics

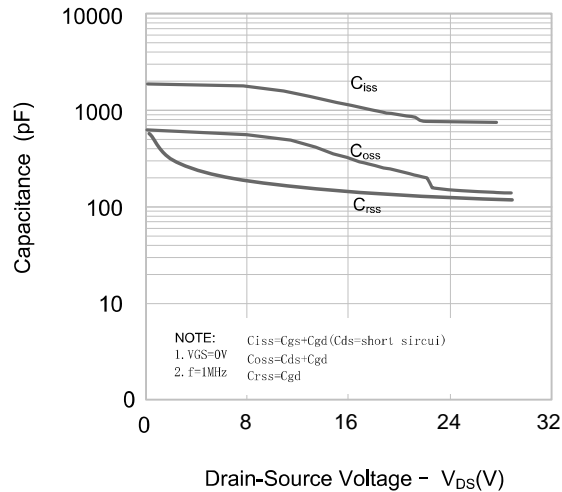
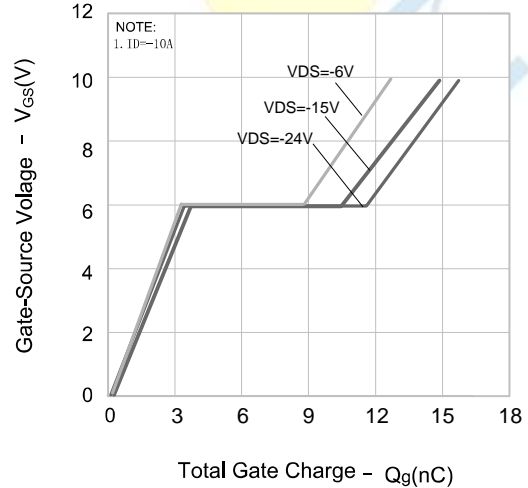


Figure 6. Gate Charge Characteristics



P-Channel Typical Performance Characteristics

Figure 7. Breakdown Voltage Variation vs. Temperature

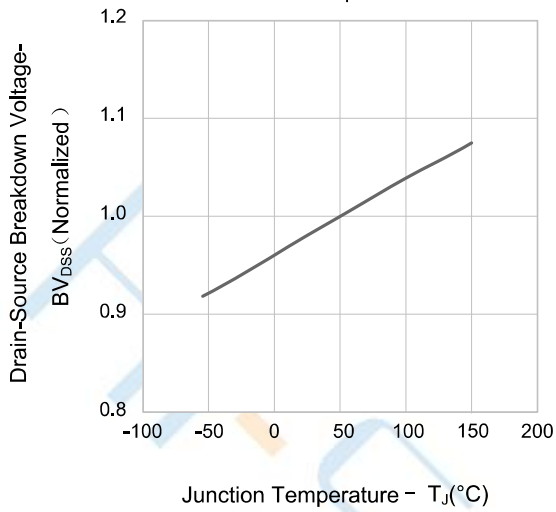


Figure 8. On-resistance Variation vs. Temperature

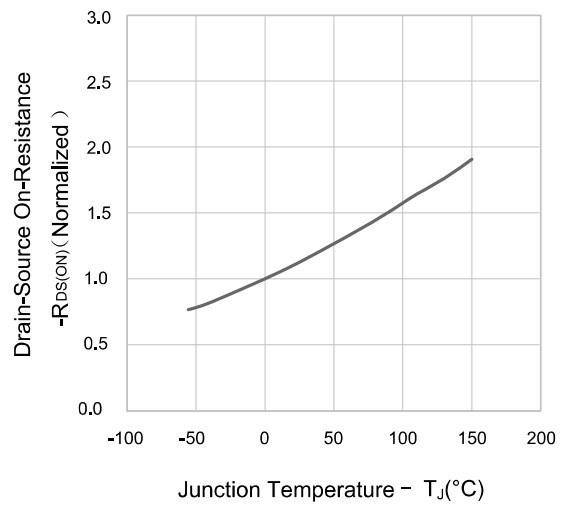
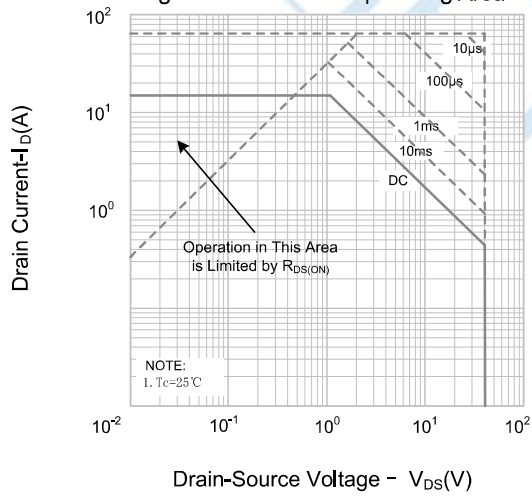
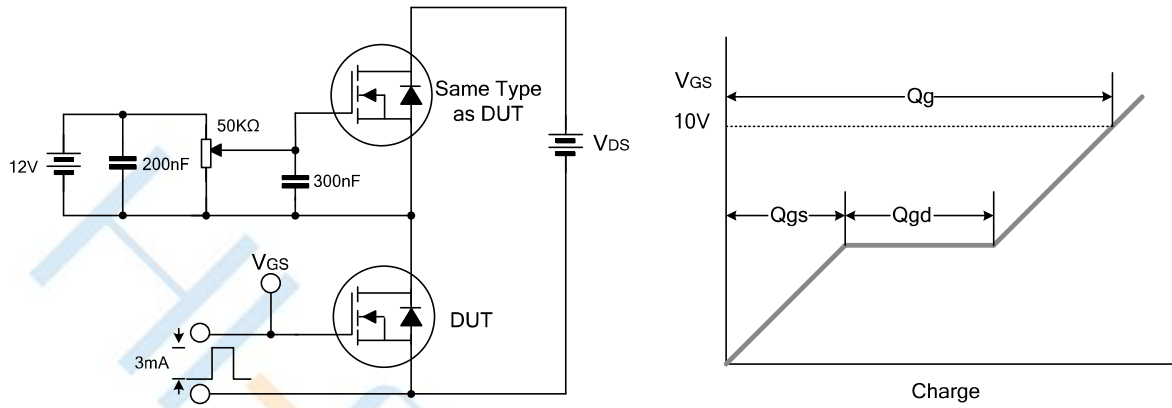


Figure 9. Max. Safe Operating Area

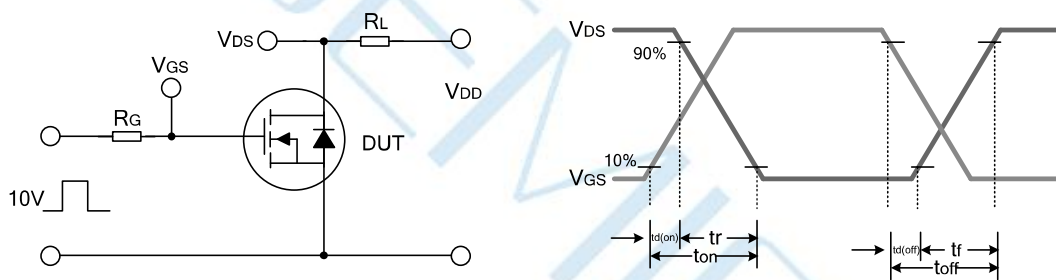


Test Circuit

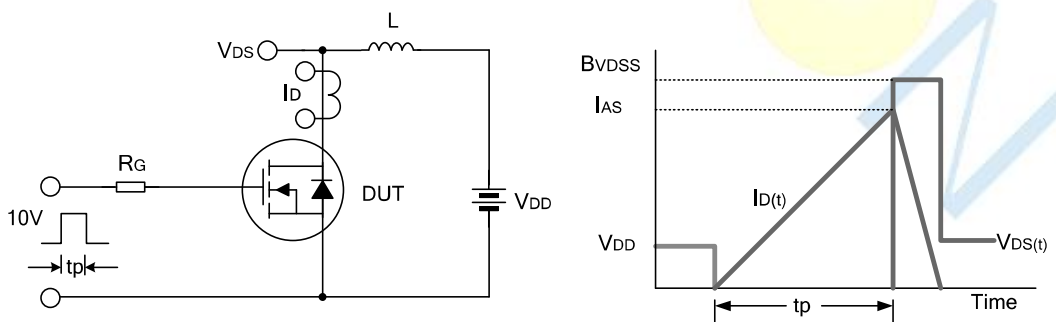
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

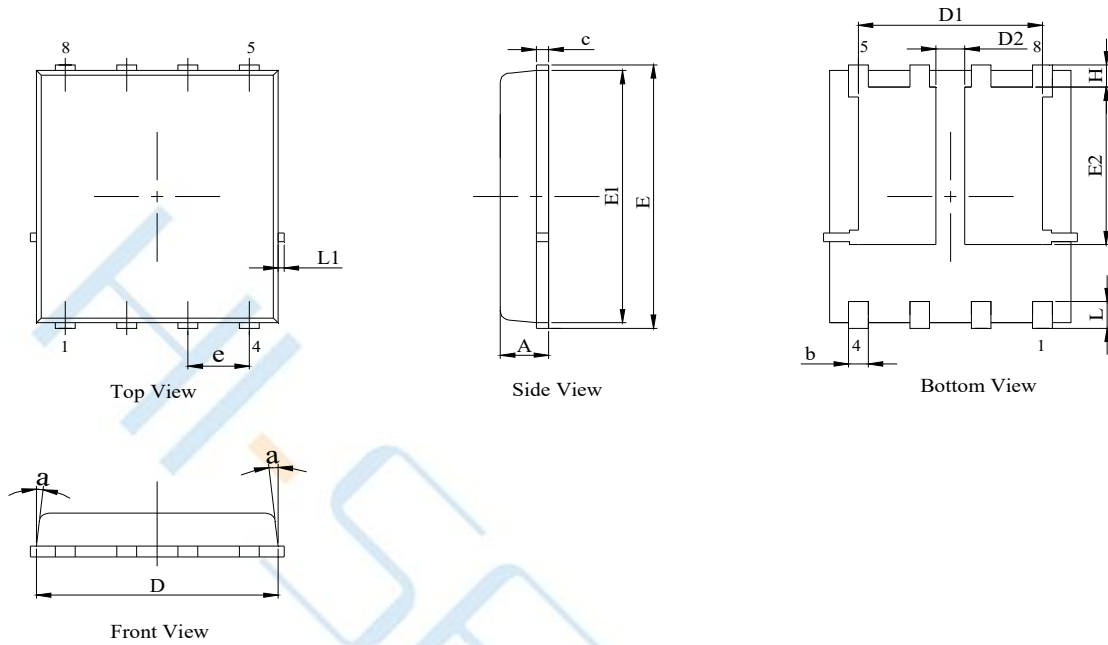


Unclamped Inductive Switching Test Circuit & Waveform





Package Dimensions of PDFN5\*6-8L



DIM.	MILLIMETER	
	MIN.	MAX.
A	0.90	1.10
b	0.33	0.51
c	0.23	0.33
D	4.80	5.40
D1	3.61	4.25
D2	0.50	0.70
E	5.90	6.25
E1	5.55	5.80
E2	3.35	3.78
e	1.27 BSC	
H	0.41	0.80
L	0.51	0.80
L1	-	0.15
a	0°	12°

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