

**-10A,-18V P-Channel Power MOSFET**

**GENERAL DESCRIPTION**

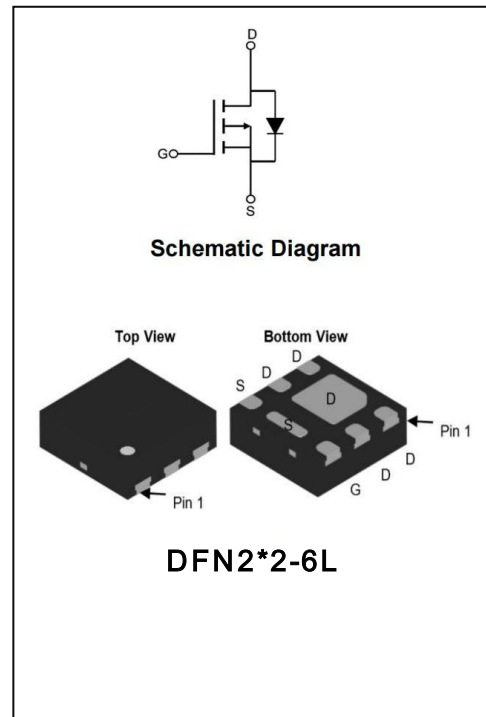
The Power MOSFET has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.

**Features**

- ◆  $V_{DS}=-18V, I_D=-10A$
- ◆  $R_{DS(ON)}$   
 TYP:  $12m\Omega @ V_{GS} = -4.5V$   
 TYP:  $17m\Omega @ V_{GS} = -2.5V$

**Applications**

- ◆ Load Switch
- ◆ PWM Applications
- ◆ Power Management



**ORDERING INFORMATION**

Part No.	Package	Marking	Material	Packing
SFR0210PT	DFN2*2	0210PT	Pb Free	Reel

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

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V <sub>DS</sub>	-18	V
Gate-Source Voltage		V <sub>GS</sub>	±12	V
Drain Current	T <sub>C</sub> = 25°C	I <sub>D</sub>	-10	A
	T <sub>C</sub> = 75°C		-6.8	
Drain Current Pulsed(Note 1)		I <sub>DM</sub>	-40	A
Power Dissipation(T <sub>C</sub> =25°C) -Derate above 25°C		P <sub>D</sub>	14	W
Single Pulsed Avalanche Energy (Note 2)		E <sub>AS</sub>	24	mJ
Operation Junction Temperature Range		T <sub>J</sub>	-55~+150	°C
Storage Temperature Range		T <sub>stg</sub>	-55~+150	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300	°C

## ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain -Source Breakdown Voltage	B <sub>VDSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-20	--	--	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V	--	--	1	uA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = 12V, V <sub>DS</sub> = 0V	--	--	100	nA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = -12V, V <sub>DS</sub> = 0V	--	--	-100	
<b>On Characteristics</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250μA	-0.4	-0.7	-1.0	V
Static Drain- Source On State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -7.0A	--	12	16	mΩ
		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -4.0A	--	17	22	
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -10V V <sub>GS</sub> = 0V f=1.0MHZ	--	1734	--	pF
Output Capacitance	C <sub>oss</sub>		--	211	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	185	--	
<b>Switching Characteristics</b>						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -10V, V <sub>GS</sub> = -4.5V R <sub>G</sub> = 3 Ω, I <sub>D</sub> = -10A (Note 3.4)	--	8.2	--	nS
Turn-on Rise Time	t <sub>r</sub>		--	32	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	70	--	
Turn-off Fall Time	t <sub>f</sub>		--	71	--	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-10V, I <sub>D</sub> =-10A V <sub>GS</sub> =-4.5V (Note 3.4)	--	15.8	--	nC
Gate-Source Charge	Q <sub>gs</sub>		--	4.1	--	
Gate-Drain Charge	Q <sub>gd</sub>		--	2.9	--	

**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	--	--	-10	A
Pulsed Source Current	$I_{SM}$		--	--	-40	
Diode Forward Voltage	$V_{SD}$	$I_S = -10A, V_{GS} = 0V$	--	-0.85	-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

Typical Performance Characteristics

Figure 1: Output Characteristics

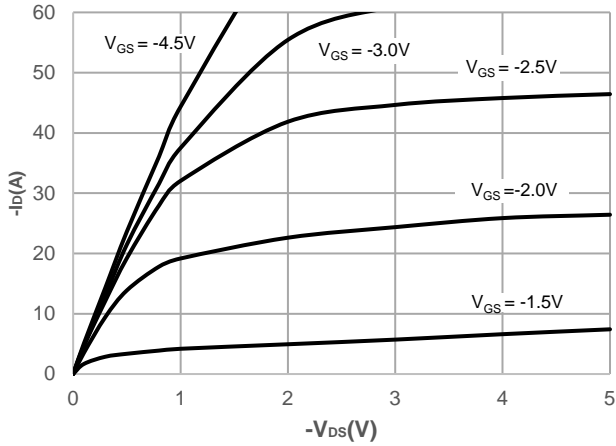


Figure 2: Typical Transfer Characteristics

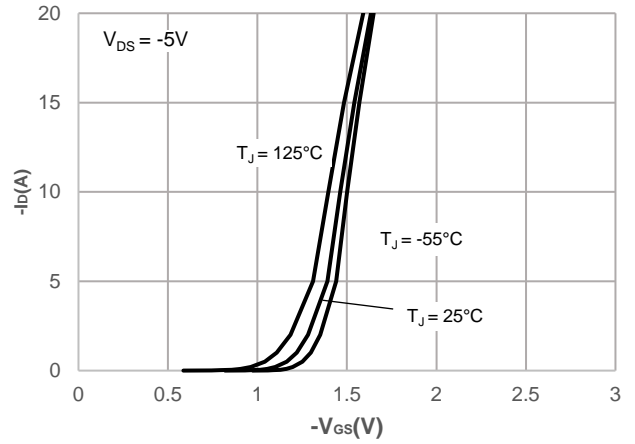


Figure 3: On-resistance vs. Drain Current

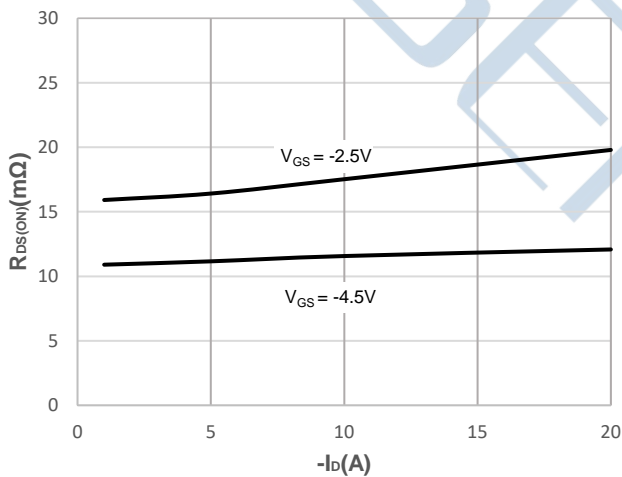


Figure 4: Body Diode Characteristics

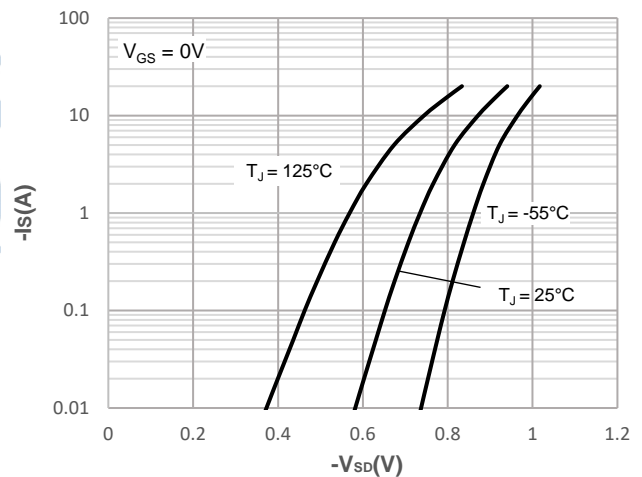


Figure 5: Gate Charge Characteristics

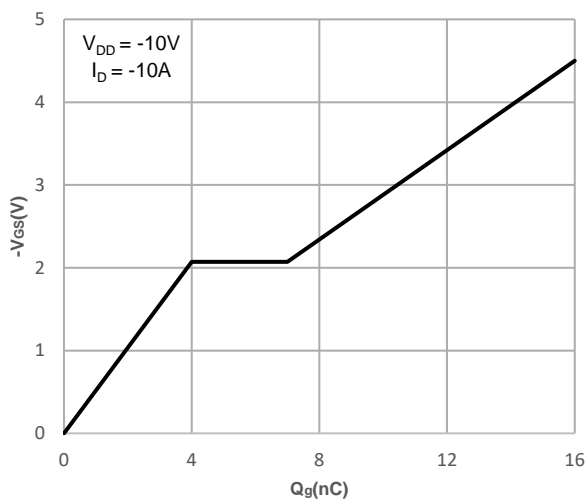
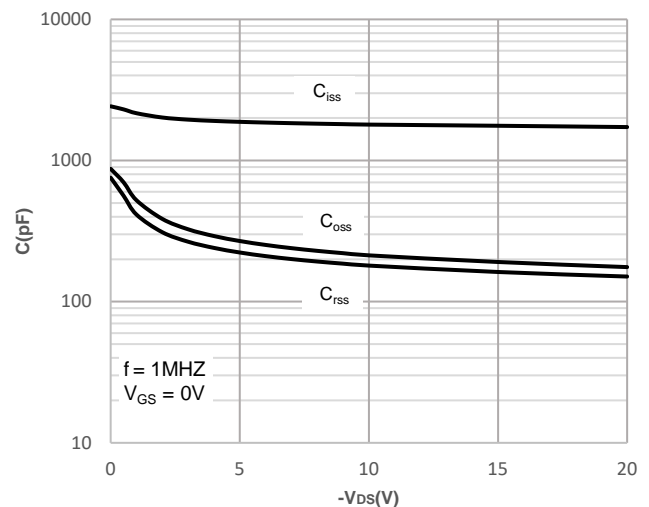


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

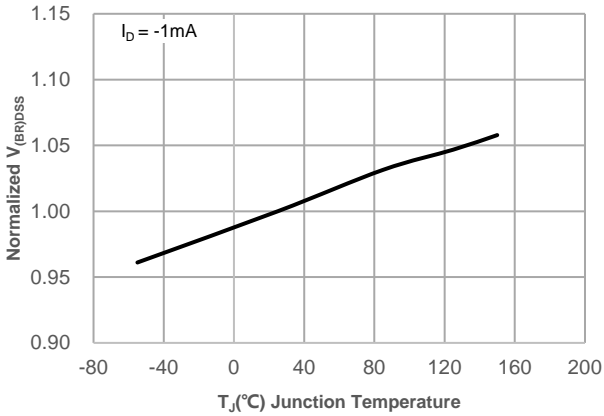


Figure 8: Normalized on Resistance vs. Junction Temperature

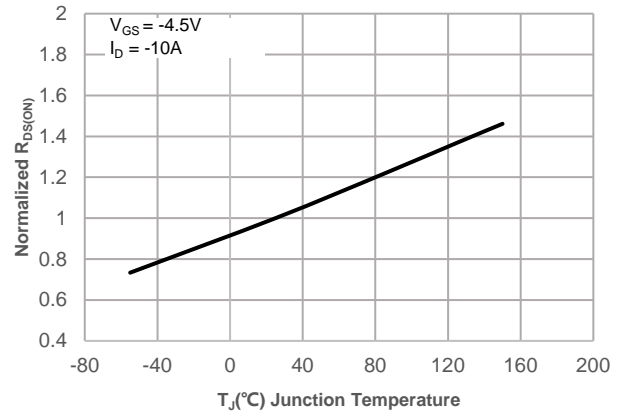


Figure 9: Maximum Safe Operating Area

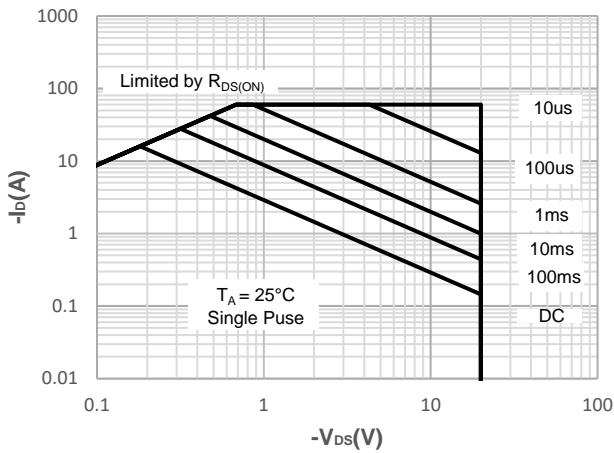


Figure 10: Maximum Continuous Driand Current vs. Ambient Temperature

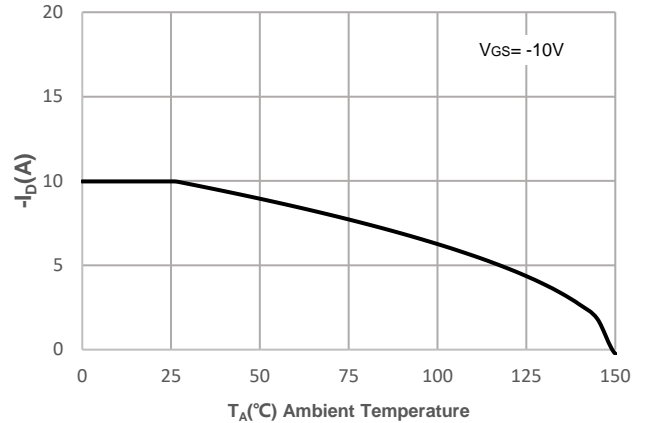


Figure 11: Normalized Maximum Transient Thermal Impedance

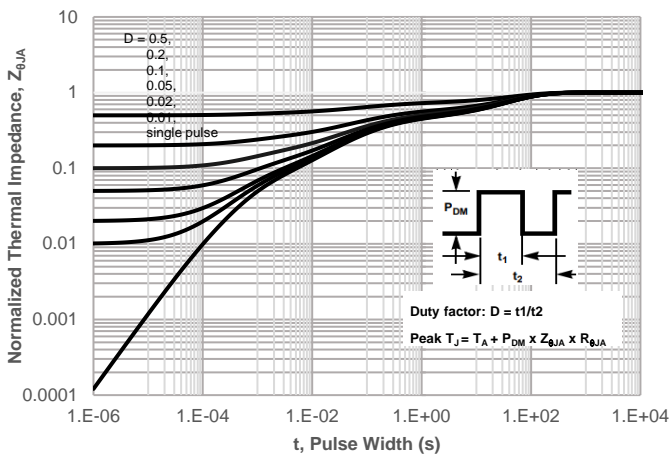
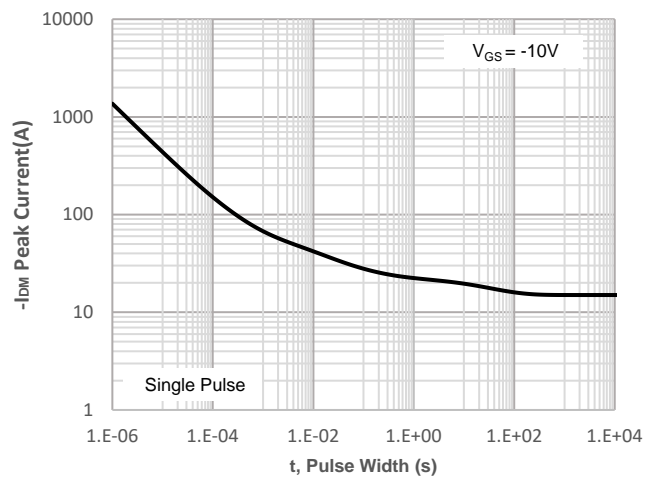
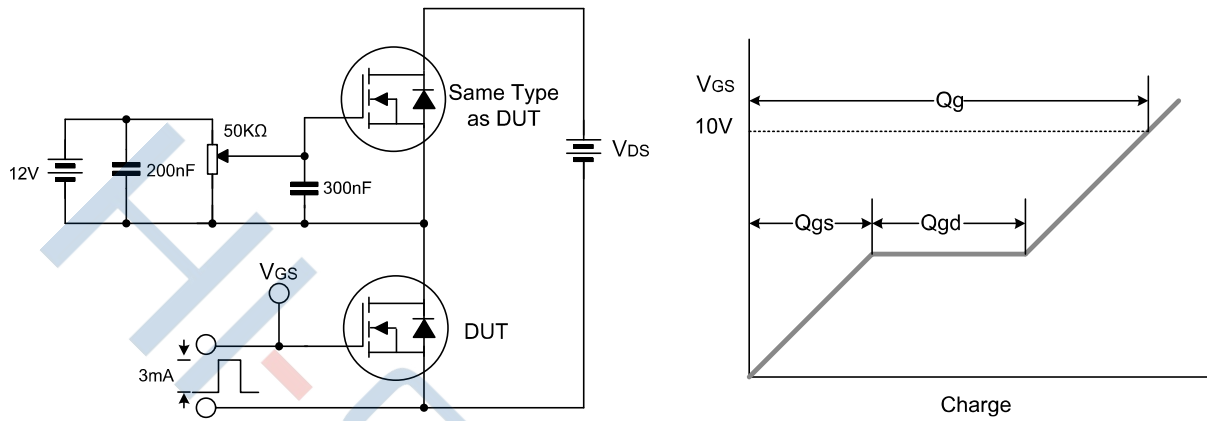


Figure 12: Peak Current Capacity

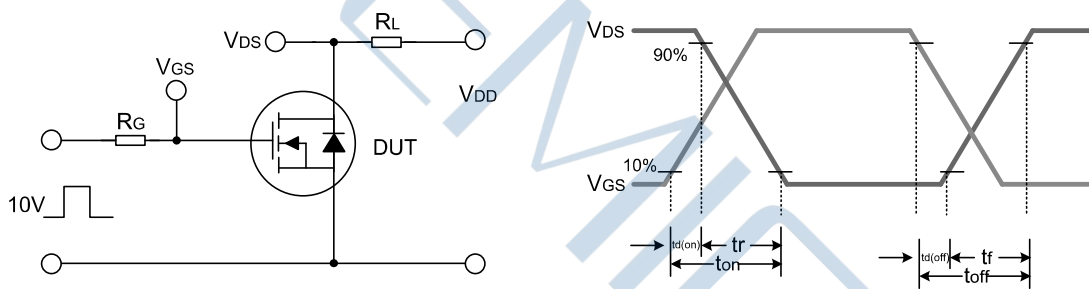


Test Circuit

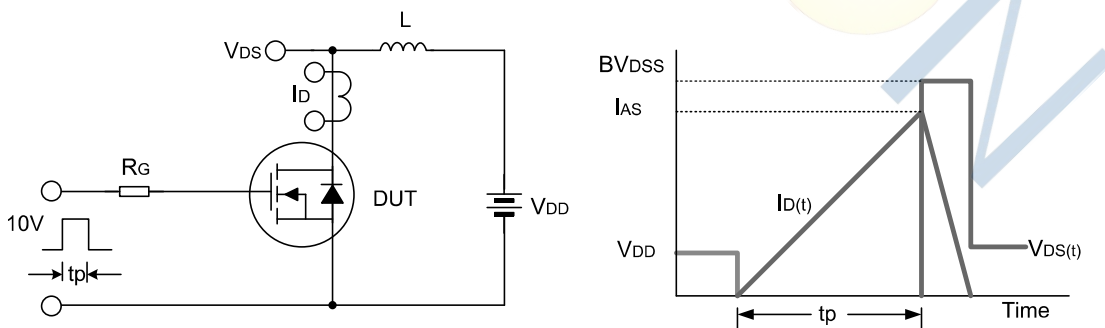
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

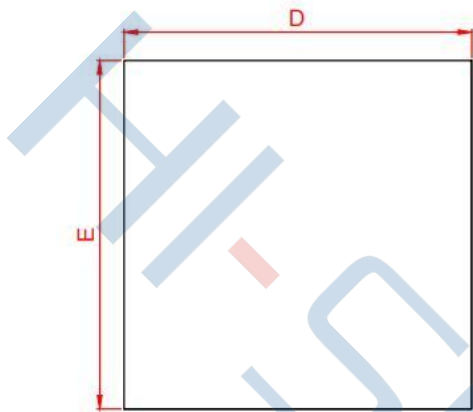


Unclamped Inductive Switching Test Circuit & Waveform

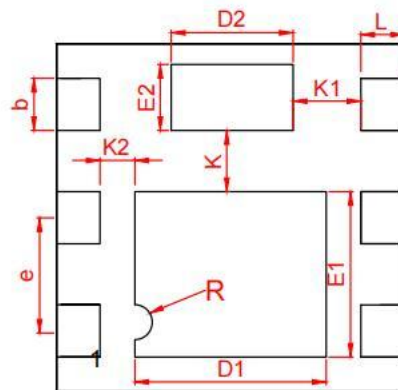


Package Dimensions of DFN2\*2

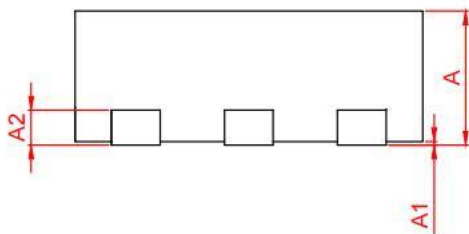
Unit:mm



TOP VIEW



BOTTOM VIEW



SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
*A1	0.00	0.02	0.05
*b	0.25	0.30	0.35
*A2	0.203 BSC		
*D	1.90	2.00	2.10
*E	1.90	2.00	2.10
*E1	0.90	0.95	1.00
*E2	0.33	0.38	0.43
*D1	1.10	1.15	1.20
*D2	0.65	0.70	0.75
*e	0.65 REF		
*L	0.22	0.25	0.27
*K	0.30	0.35	0.40
*K1	0.35	0.40	0.45
*K2	0.18	0.20	0.22

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