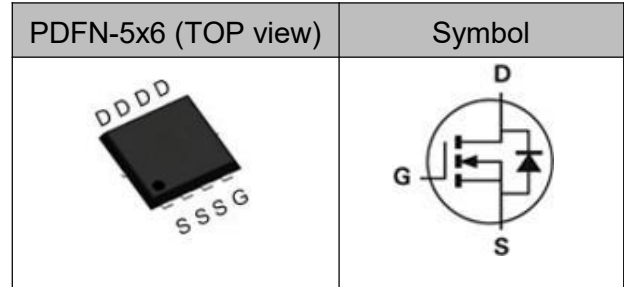


### Features

- ◆ 60V, 111A,  $R_{DS(ON)}(Typ.) = 2.3m\Omega @ V_{GS} = 10V$ .
- ◆ Reliable and Rugged
- ◆ Fast Switching Speed
- ◆ Green Device Available
- ◆ 100% EAS Guaranteed

### Application

- ◆ High Frequency Switching and Synchronous
- ◆ DC/DC Converter



### Absolute Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Unit
$V_{DS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	
$I_D$	Drain Current-Continuous, $T_C = 25^\circ C$	111	A
	Drain Current-Continuous, $T_C = 100^\circ C$	70	
	Drain Current-Continuous, $T_A = 25^\circ C$	21	
	Drain Current-Continuous, $T_A = 70^\circ C$	17	
$I_{DM}$	Drain Current-Pulsed <sup>a</sup>	222	
$E_{AS}$	Avalanche Energy, Single pulse <sup>b</sup>	135	mJ
$I_{AS}$	Avalanche Current	52	A
$P_D$	Total Power Dissipation @ $T_C = 25^\circ C$	66	W
	Total Power Dissipation @ $T_C = 100^\circ C$	26	
	Total Power Dissipation @ $T_A = 25^\circ C$	2.6	
	Total Power Dissipation @ $T_A = 70^\circ C$	1.6	
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to 150	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance Junction-Case	1.9	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>c</sup>	49	$^\circ C/W$
$R_{\theta JT}$	Thermal Resistance Junction-Top of package <sup>c</sup>	18	$^\circ C/W$



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

■ **Off Characteristics**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	60	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	$I_D = 1mA$	-	23	-	mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 60V, V_{GS} = 0V$	-	-	1	$\mu A$
		$T_J = 55^\circ\text{C}$	-	-	5	
$I_{GSS}$	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	$\pm 100$	nA

■ **On Characteristics**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	-	2.1	-	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		-	-7.1	-	mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance <sup>d</sup>	$V_{GS} = 10V, I_D = 20A$ $T_J = 25^\circ\text{C}$	-	2.3	3.0	m $\Omega$
		$V_{GS} = 10V, I_D = 20A$ $T_J = 125^\circ\text{C}$	-	3.5		
		$V_{GS} = 4.5V, I_D = 20A$ $T_J = 25^\circ\text{C}$	-	3.5	4.5	
		$V_{GS} = 4.5V, I_D = 20A$ $T_J = 125^\circ\text{C}$	-	4.9		
gfs	Forward Transconductance	$V_{DS} = 5V, I_D = 20A$	-	90	-	S

■ **Dynamic Characteristics**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$R_g$	Gate Resistance	$f = 1.0MHz$	-	0.4	-	$\Omega$
$C_{iss}$	Input Capacitance	$V_{DS} = 30V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	4500	-	pF
$C_{oss}$	Output Capacitance		-	1230	-	
$C_{riss}$	Reverse Transfer Capacitance		-	39	-	
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 30V, I_D = 20A,$ $R_G = 3\Omega, V_{GS} = 10V$	-	17	-	ns
$t_r$	Turn-On Rise Time		-	29	-	
$t_{d(off)}$	Turn-Off Delay Time		-	54	-	
$t_f$	Turn-Off Fall Time		-	11	-	
$Q_g$	Total Gate Charge	$V_{DS} = 30V, I_D = 20A,$ $V_{GS} = 10V$	-	70	-	nC
$Q_g$	Total Gate Charge	$V_{DS} = 30V, I_D = 20A,$ $V_{GS} = 4.5V$	-	34	-	
$Q_{gs}$	Gate-Source Charge		-	16	-	
$Q_{gd}$	Gate-Drain Charge		-	12	-	
$V_{gp}$	Gate Plateau Voltage		-	3.4	-	



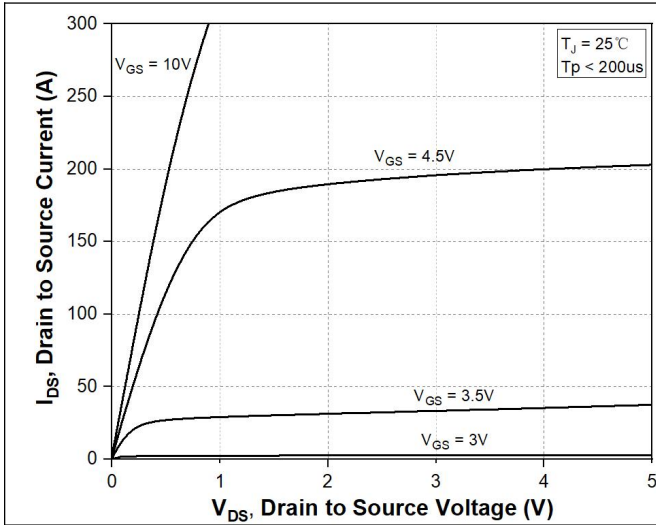
■ **Drain-Source Diode Characteristics**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	-	-	111	A
$I_{SM}$	Pulse Source Current		-	-	222	A
$V_{SD}$	Drain-Source Diode Forward Voltage <sup>d</sup>	$V_{GS} = 0V, I_{SD} = 1A$	-	0.7	1.0	V
$t_{rr}$	Reverse Recovery Time	$I_F = 20A, V_{GS} = 0V$ $di/dt=100A/us$ ,	-	51	-	ns
$Q_{rr}$	Reverse Recovery Charge		-	50	-	nC

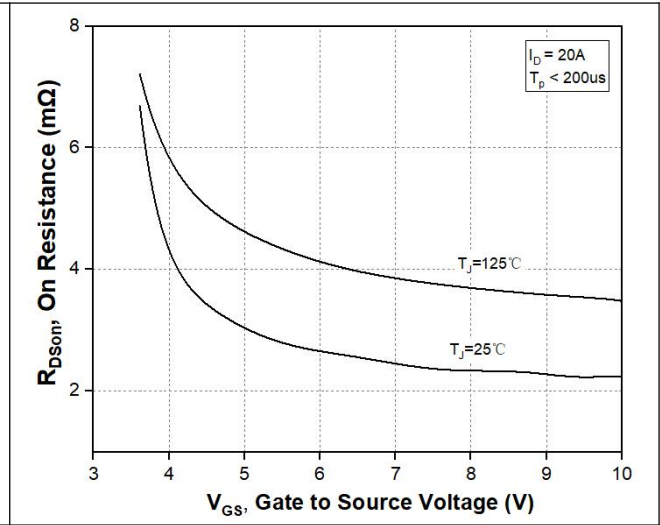
Notes:

- a: Max. current is limited by junction temperature.
- b: The EAS data shows Max. Rating. The test condition is  $V_{DD}=50V, V_{GS}=10V, L=0.1mH, I_{AS}=52A$ .
- c: Surface Mounted on 1in2 FR-4 board with 1oz.
- d: Pulse test (pulse width  $\leq 300us$ , duty cycle  $\leq 2\%$ ).
- e: Guaranteed by design, not subject to production testing.

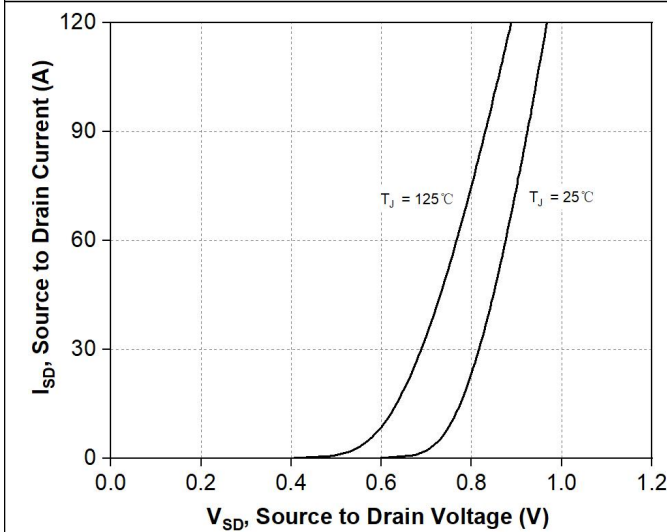
■ **Typical Characteristics**



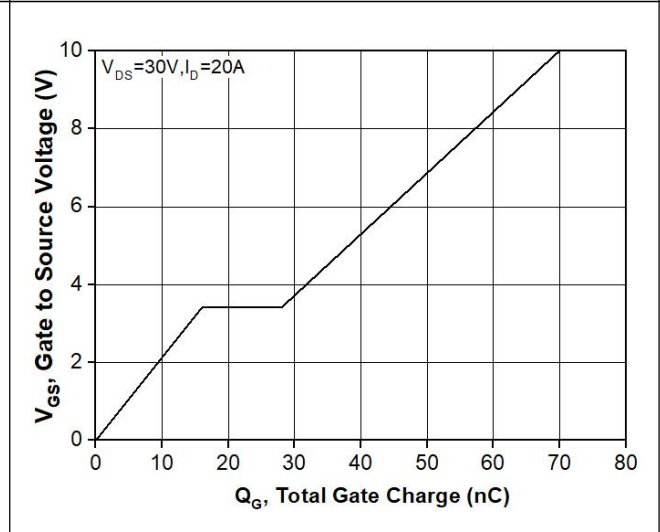
**Figure 1. Typical Output Characteristics**



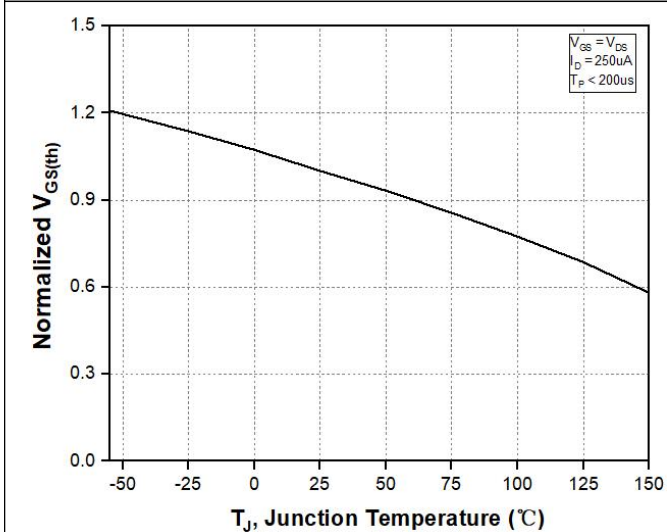
**Figure 2. On-Resistance vs. Gate -Source**



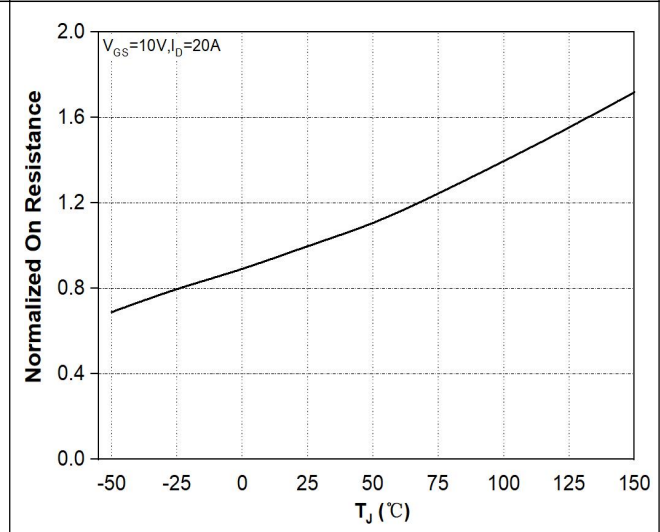
**Figure 3. Forward Characteristics of Reverse**



**Figure 4. Gate-Charge Characteristics**



**Figure 5. Normalized  $V_{GS(th)}$  vs.  $T_J$**



**Figure 6. Normalized  $R_{DS(on)}$  vs.  $T_J$**

### Typical Characteristics

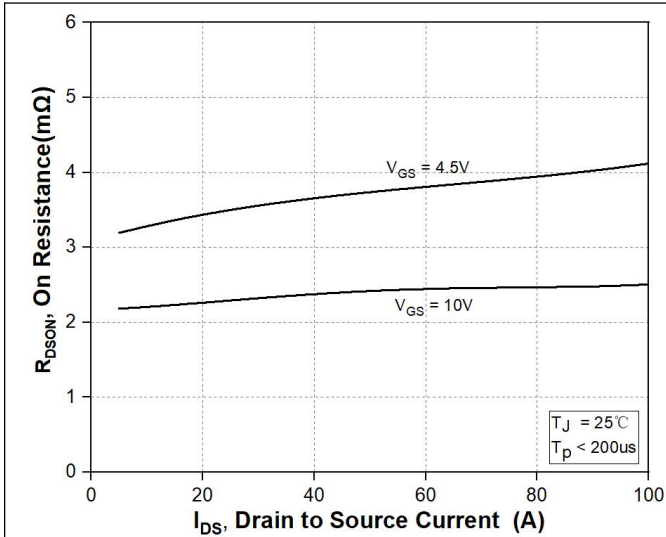


Figure 7. Drain-Source On-State Resistance

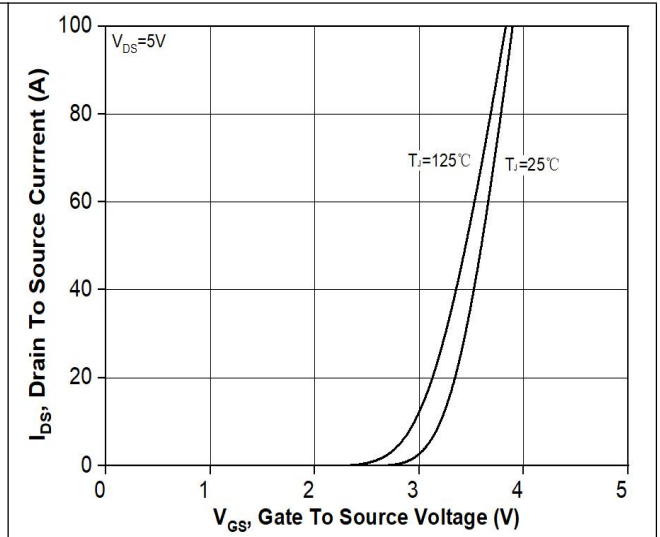


Figure 8. Transfer Characteristics

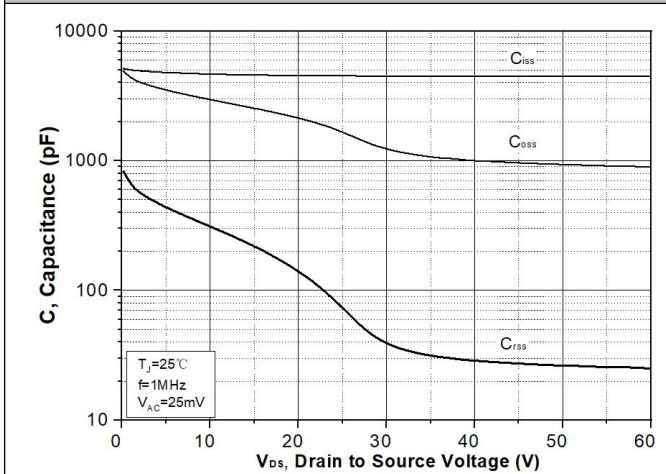


Figure 9. Capacitance

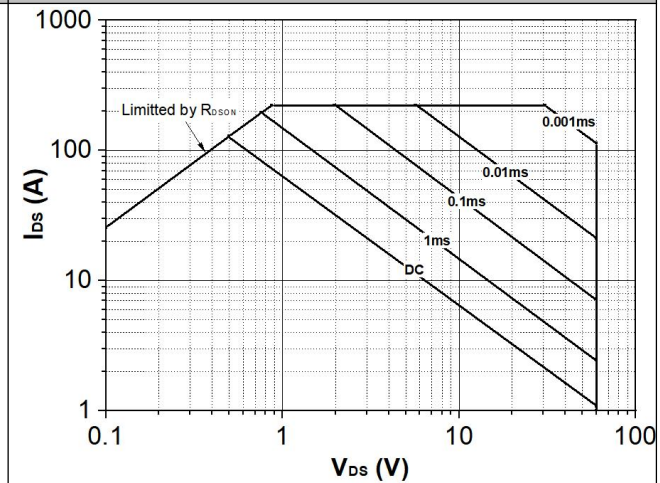


Figure 10. Safe Operating Area

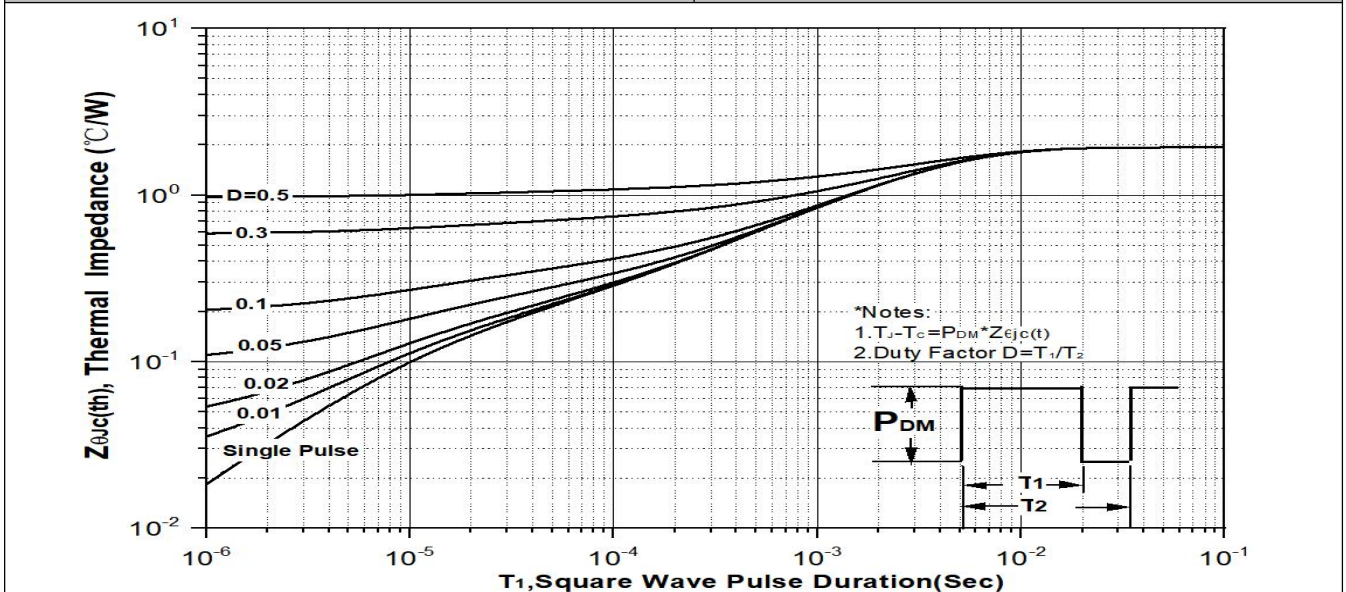


Figure 11. Transient Thermal Impedance

### ■ Package Information

PDFN5 X6

Unit:mm

