



- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

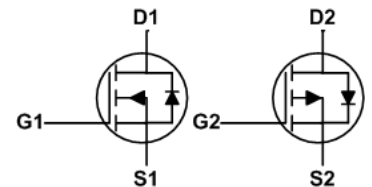
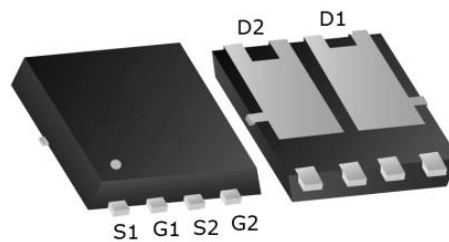
Description

The XXW4020 is the high performance complementary N-ch and P-ch MOSFETs with high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The XXW4020 meet the RoHS and Green

Product Summary

BVDSS	RDSON	ID
40V	17mΩ	20A
-40V	33mΩ	-20A

PDFN5060-8L Pin Configuration



Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

Symbol	Parameter	Max. N-Channel	Max. P-Channel	Units	
V _{DSS}	Drain-Source Voltage	40	-40	V	
V _{GSS}	Gate-Source Voltage	±20	±20	V	
I _D	Continuous Drain Current	T _C = 25°C	20	-20	A
		T _C = 100°C	10	-10	A
I _{DM}	Pulsed Drain Current ^{note1}	64	-64	A	
E _{EAS}	Single Pulsed Avalanche Energy ^{note2}	19	27.5	mJ	
P _D	Power Dissipation	9.6	22	W	
R _{θJA}	Thermal Resistance, Junction to Case	13	5.7	°C/W	
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150		°C	

N-Ch and P-Ch Fast Switching MOSFETs
N-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$	-	-	1.0	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note3</small>	$V_{GS}=10V, I_D=8A$	-	17	22	m Ω
		$V_{GS}=4.5V, I_D=5A$	-	25	35	m Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=20V, V_{GS}=0V,$ $f=1.0MHz$	-	633	-	pF
C_{oss}	Output Capacitance		-	67	-	pF
C_{rss}	Reverse Transfer Capacitance		-	58	-	pF
Q_g	Total Gate Charge	$V_{DS}=20V, I_D=8A,$ $V_{GS}=10V$	-	12	-	nC
Q_{gs}	Gate-Source Charge		-	3.2	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	3.1	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=20V, R_L=2.5\Omega$ $V_{GS}=10V, R_{REN}=3\Omega$	-	4	-	ns
t_r	Turn-on Rise Time		-	3	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	15	-	ns
t_f	Turn-off Fall Time		-	2	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	8	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	32	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=8A$	-	-	1.2	V

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

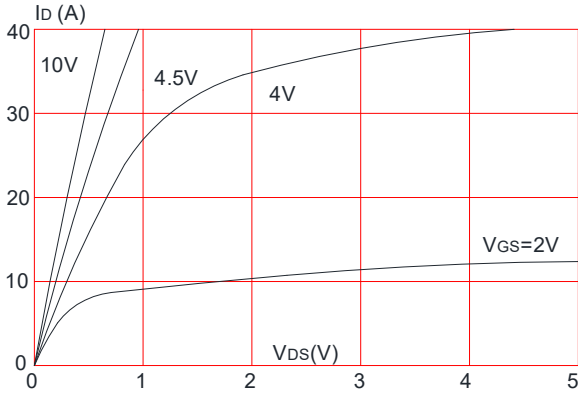
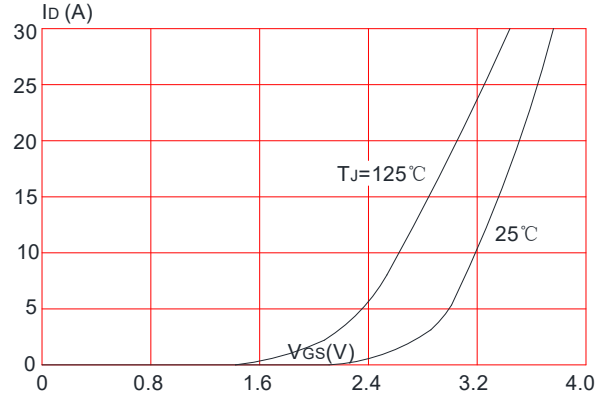
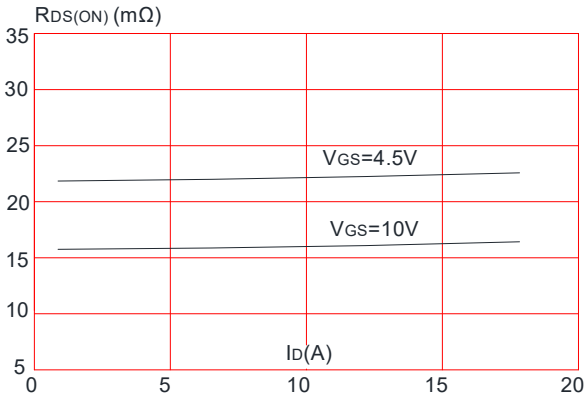
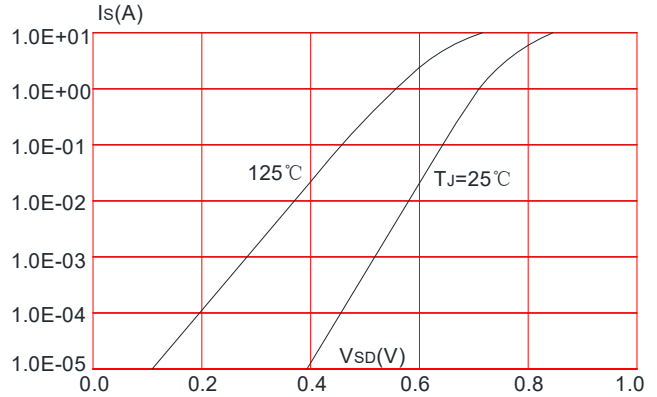
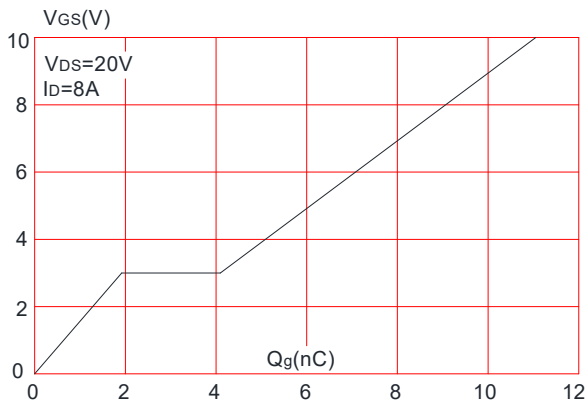
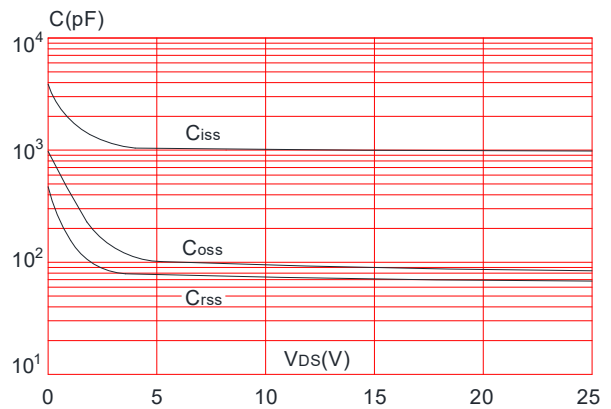
2. EAS condition : $T_J=25^\circ\text{C}, V_{DD}=20V, V_G=10V, L=0.5mH, R_g=25\Omega, I_{AS}=7.2A$

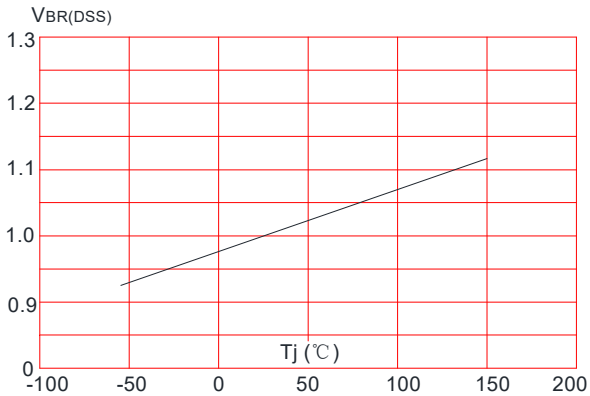
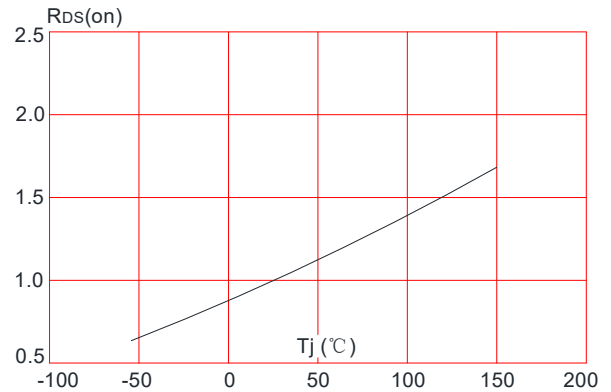
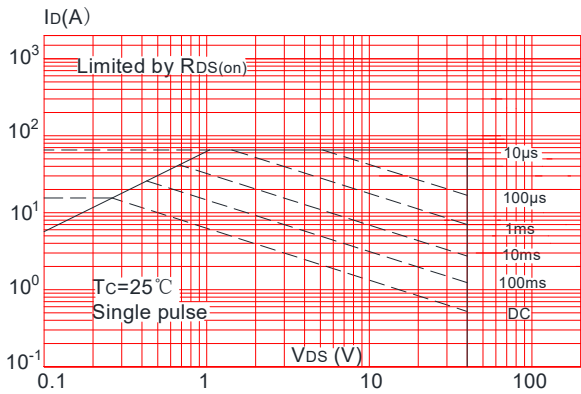
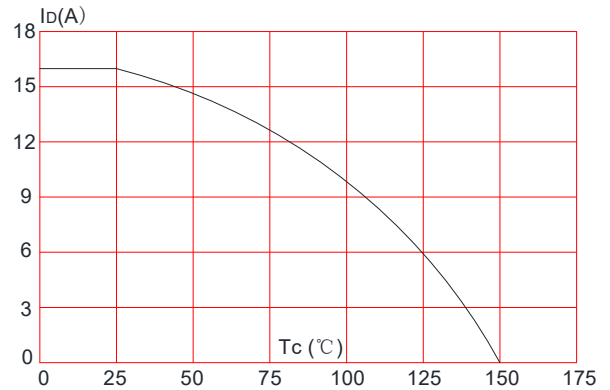
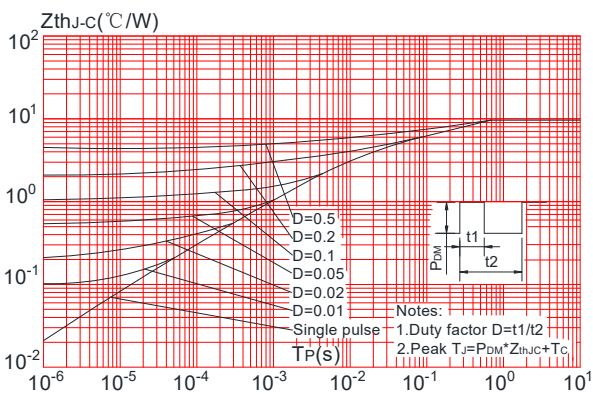
$T_J=25^\circ\text{C}, V_{DD}=-20V, V_G=-10V, L=0.5mH, R_g=25\Omega, I_{AS}=-8.4A$

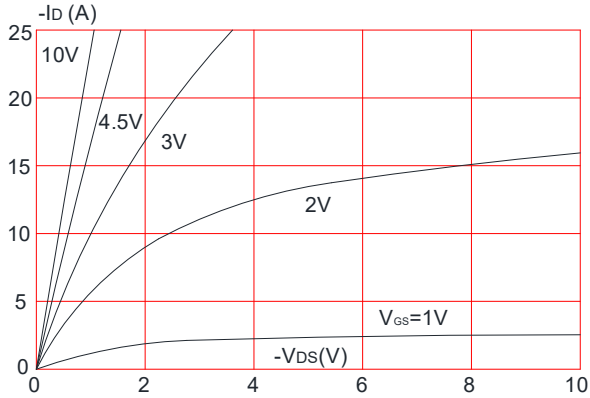
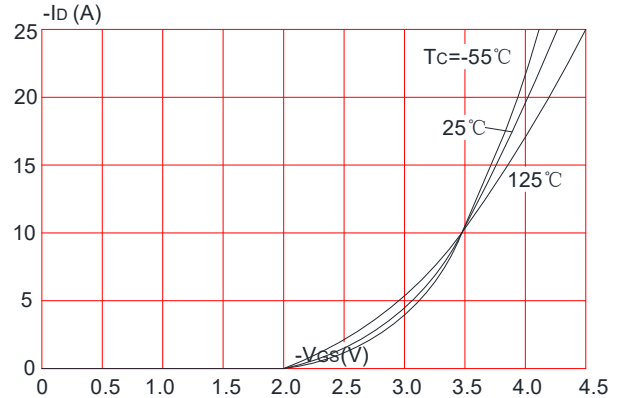
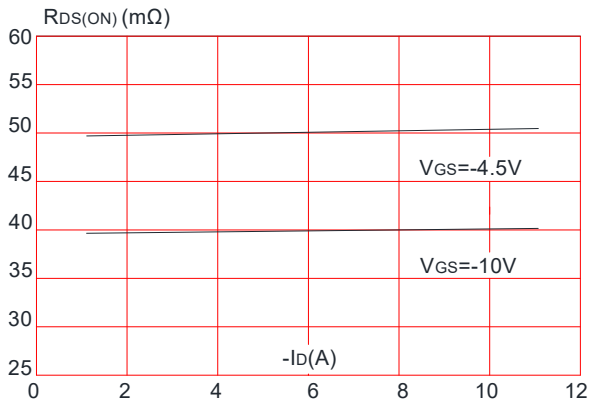
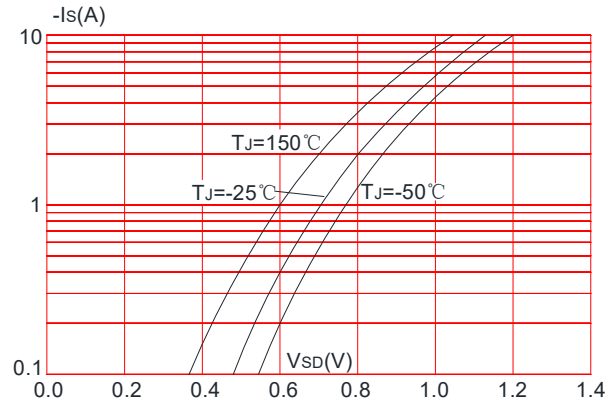
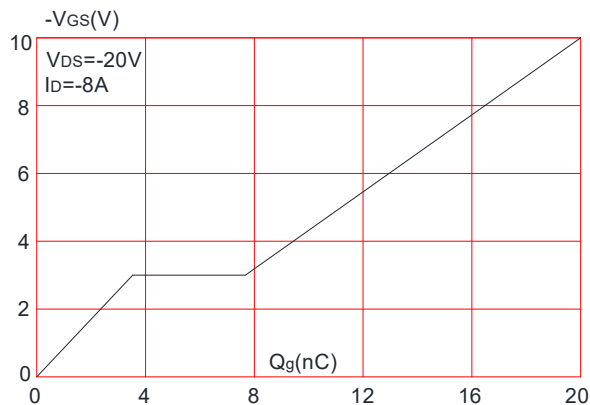
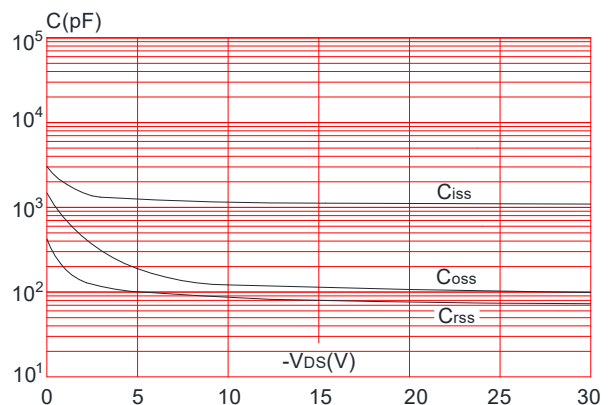
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

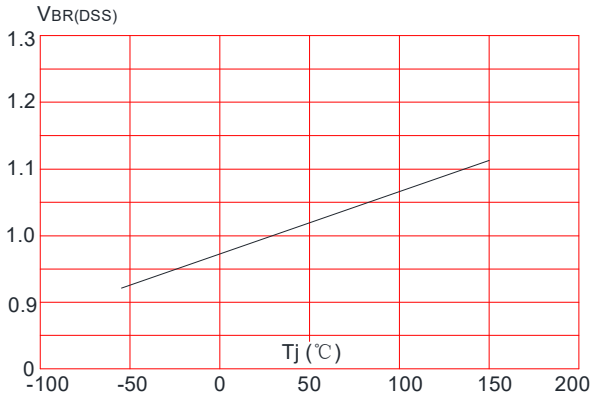
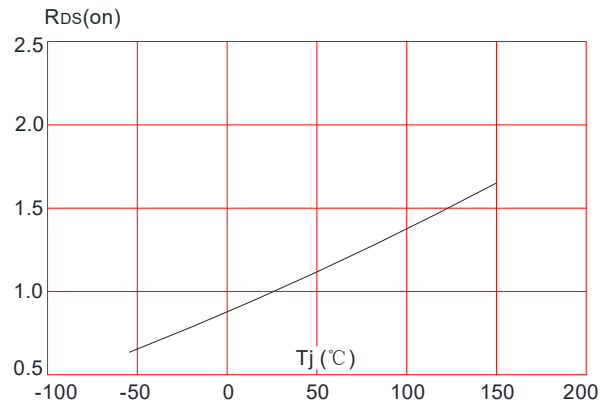
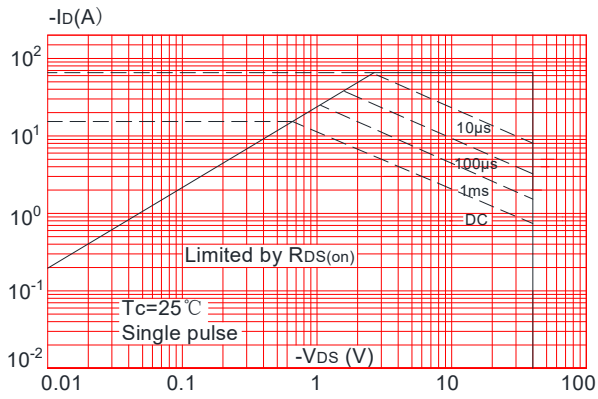
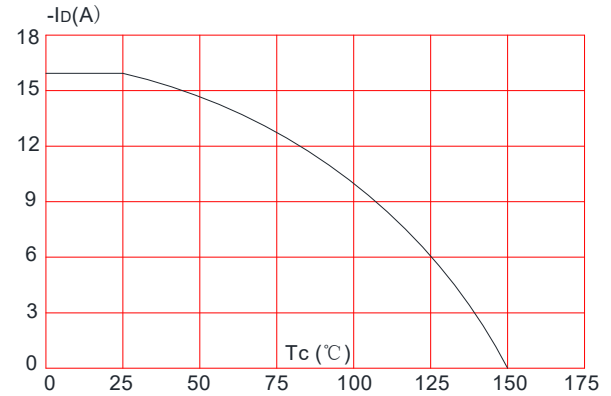
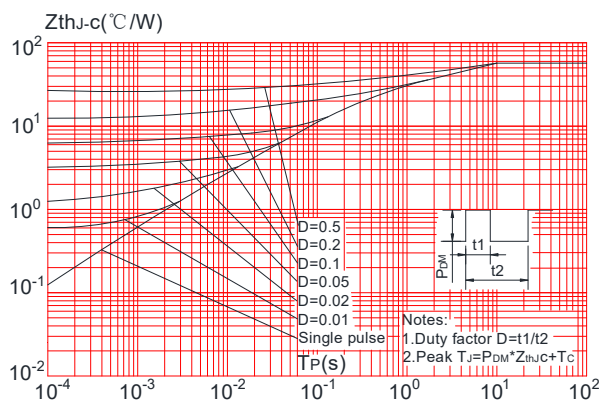
N-Ch and P-Ch Fast Switching MOSFETs
P-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

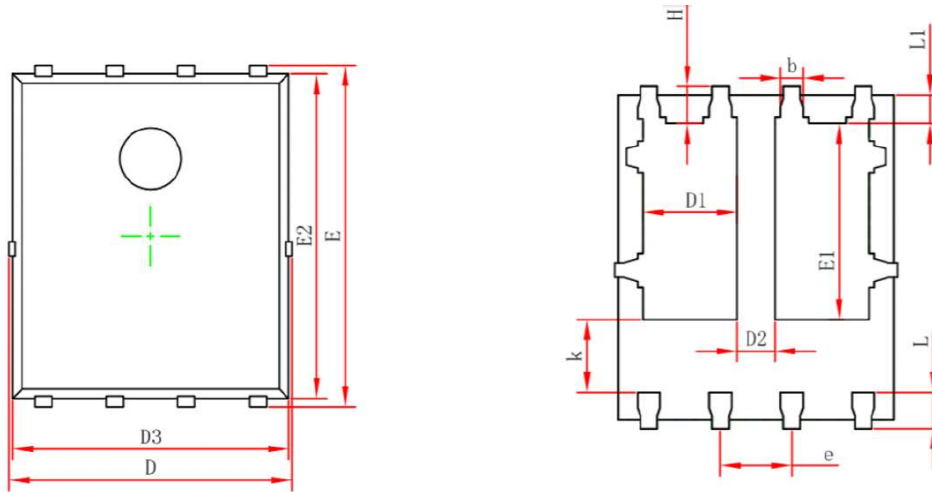
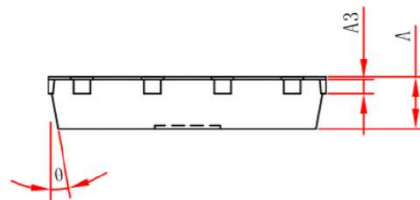
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-40V, V_{GS}=0V$	-	-	-1	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.6	-2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note3</small>	$V_{GS}=-10V, I_D=-8A$	-	33	52	m Ω
		$V_{GS}=-4.5V, I_D=-5A$	-	45	70	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=-20V, V_{GS}=0V,$ $f=1.0MHz$	-	1034	-	pF
C_{oss}	Output Capacitance		-	107	-	pF
C_{rss}	Reverse Transfer Capacitance		-	79.5	-	pF
Q_g	Total Gate Charge	$V_{DS}=-20V, I_D=-8A,$ $V_{GS}=-10V$	-	20	-	nC
Q_{gs}	Gate-Source Charge		-	3.5	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	4.2	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=-20V, I_D=-16A,$ $V_{GS}=-10V, R_{GEN}=2.5\Omega$	-	8	-	ns
t_r	Turn-on Rise Time		-	15	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	23	-	ns
t_f	Turn-off Fall Time		-	9	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-20	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-64	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=-16A$	-	-0.8	-1.2	V
t_{rr}	Reverse Recovery Time	$V_{GS}=0V, I_S=-16A,$ $di/dt=100A/\mu s$	-	29	-	ns
Q_{rr}	Reverse Recovery Charge		-	20	-	nC

Typical Performance Characteristics-N
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


N-Ch and P-Ch Fast Switching MOSFETs
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 Drain Current vs. Case Temperature

Maximum Effective Transient Thermal Impedance, Junction-to-Case


Typical Performance Characteristics-P
Figure 1: Output Characteristics

Figure 2: Typical Transfer Characteristics

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Figure 6: Capacitance Characteristics


N-Ch and P-Ch Fast Switching MOSFETs
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 Drain Current vs. Case Temperature

Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case


Package Mechanical Data- PDFN5X6-8L

Top View
Bottom View

Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.154REF.		0.006REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°