IPAN60R360PFD7S

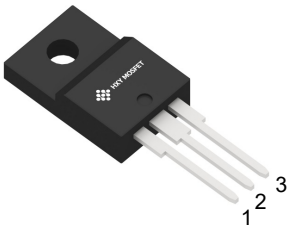
SiC Power MOSFET N-Channel Enhancement Mode

Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Easy to parallel
- Simple to drive
- RoHS Compliant

Benefits

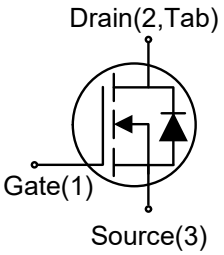
- Increased Power Density
- Faster Operating Freequency
- Reduction of Heat Sink Requirements
- Higher Efficiency
- Reduced EMI



TO-220F

Applications

- Power Factor Correction Modules
- Switch Mode Power Supplies
- DC-AC Inverters
- High Voltage DC/DC Converters



Ordering Part Number	Package	Brand
IPAN60R360PFD7S	TO-220F	HXY MOSFET

Maximum Ratings (T_C = 25 ˚C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSmax}	Drain - Source Voltage	650	V	V_{GS} = 0 V, I_D = 100 μA
V_{GSmax}	Gate - Source Voltage (dynamic)	-5/+26	V	AC (f >1 Hz)
V_{GSop}	Gate - Source Voltage (static)	0/+18	V	Static
I_D	Continuous Drain Current	15	A	T_C = 25˚C
		12		T_C = 100˚C
I_{DM}	Pulsed Drain Current	39	A	Pulse width t_P limited by T_{jmax}
P_D	Power Dissipation	52	W	T_C = 25˚C
		25		T_C = 100˚C
T_J , T_{stg}	Operating Junction and Storage Temperature	-55 to +175	˚C	

Electrical Characteristics (T_C = 25°C unless other wise specified)

Static Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D=1 mA, V_{GS}=0V	650			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=850V, V_{GS}=0V		1	15	μA
GSS	Gate-Source Leakage Current	V_{DS}=0V, V_{GS}=18V			50	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=1mA T_j=25°C T_j=175°C		3.5 2.8	4	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=18V, I_D=4.5A T_j=25°C T_j=175°C		180 205	220	mΩ
	Drain-Source On-State Resistance	V_{GS}=15V, I_D=4.5A T_j=25°C T_j=175°C		260 295	300	nA
C_{iss}	Input Capacitance	V_{DS}=400V, f=1MHz, V_{GS}=0V		180		pF
C_{oss}	Output Capacitance			20		pF
C_{rss}	Reverse Transfer Capacitance			0.9		pF
Q_g	Total Gate Charge	V_{DS}=400V, I_D=5A, R_G = 10 Ω V_{GS}= 0/15V		11.2		nC
Q_{gs}	Gate to Source Charge			2.3		nC
Q_{gd}	Gate to Drain Charge			1.1		nC
$t_{d(on)}$	Turn-On Delay Time	V_{DD}=400V, I_D=5 A, V_{GS}=-5/18 V, R_G=10Ω ,		5		ns
t_r	Rise Time			17		ns
$t_{d(off)}$	Turn-Off Delay Time			8		ns
t_f	Fall Time			10		ns
E_{on}	Turn-On Energy			25		μJ
E_{off}	Turn-Off Energy			10		μJ

Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
V_{SD}	Diode Forward Voltage	V_{GS}=-4V, I_{SD}=2.5A T_j=25°C T_j=175°C		4.0 3.6		V
I_S	Continuous Diode Forward Current	T_c=25°C T_c=100°C		15 12		A
t_{rr}	Reverse Recovery Time	I_{SD}=-5A V_{GS}=-5V, I_{SD}=4.5A, V_R=400V, di/dt=1000A/μs		50		ns
Q_{rr}	Reverse Recovery Charge			38		nC
I_{rrm}	Peak Reverse Recovery Current			2.4		A

Thermal Characteristics

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal Resistance from Junction to Case		2.88		°C/W
$R_{th(j-a)}$	Thermal Resistance from Junction to Ambient		40		°C/W

Typical Performance

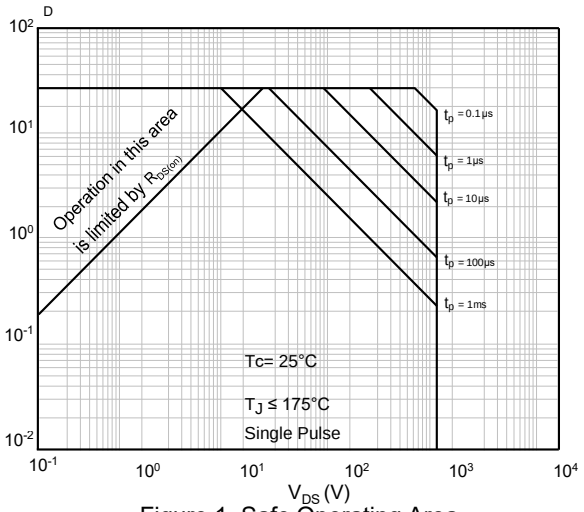


Figure 1. Safe Operating Area

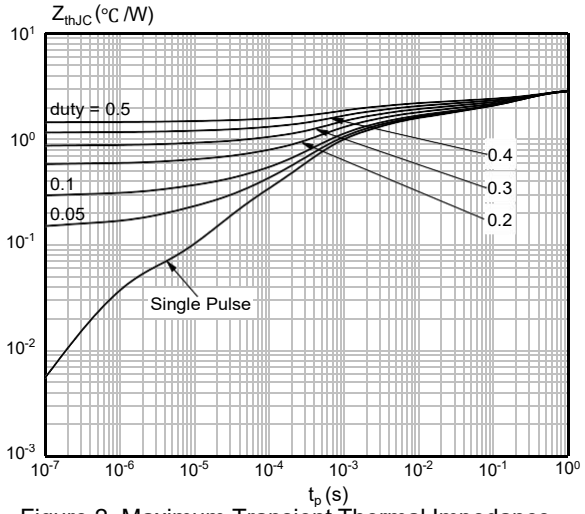


Figure 2. Maximum Transient Thermal Impedance

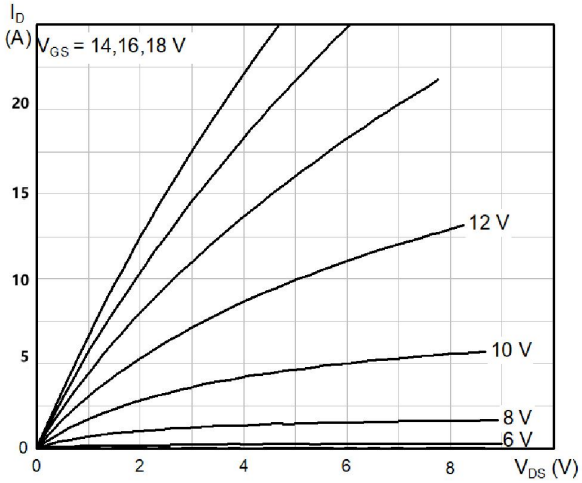


Figure 3. Typical Output Characteristics, T_J = 25°C

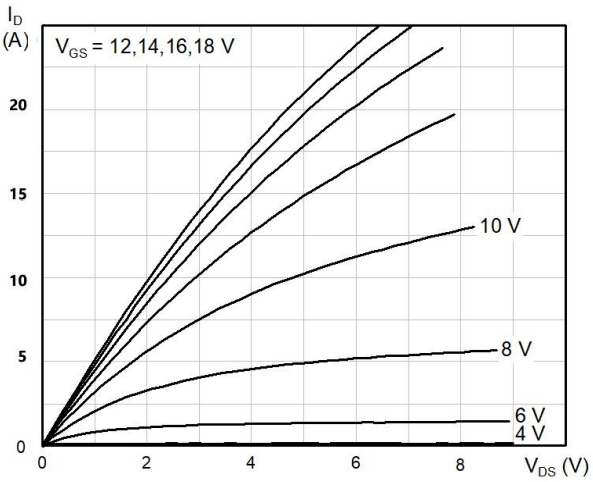


Figure 4. Typical Output Characteristics, T_J = 175°C

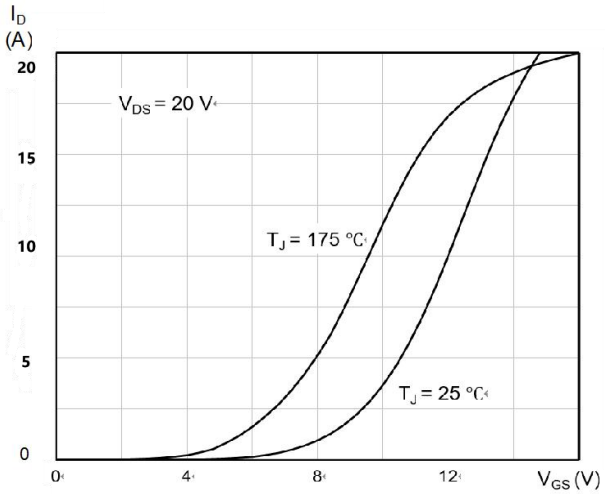


Figure 5 Typical Transfer Characteristics

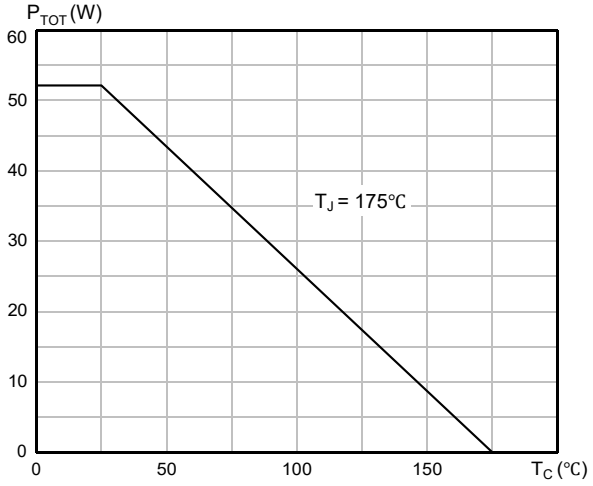


Figure 6. Total Power Dissipation

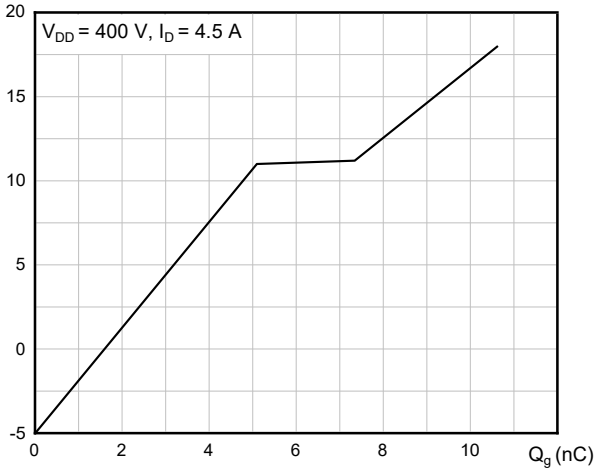


Figure 7. Typical Gate Charge Characteristics

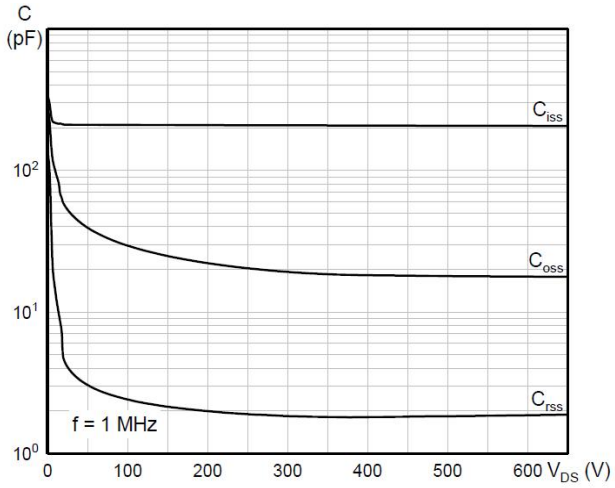


Figure 8. Typical Capacitance Characteristics

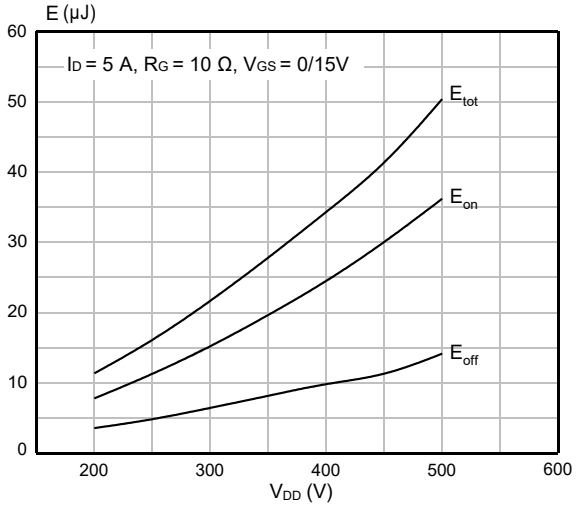


Figure 9. Typical Switching Energy vs. Supply Voltage

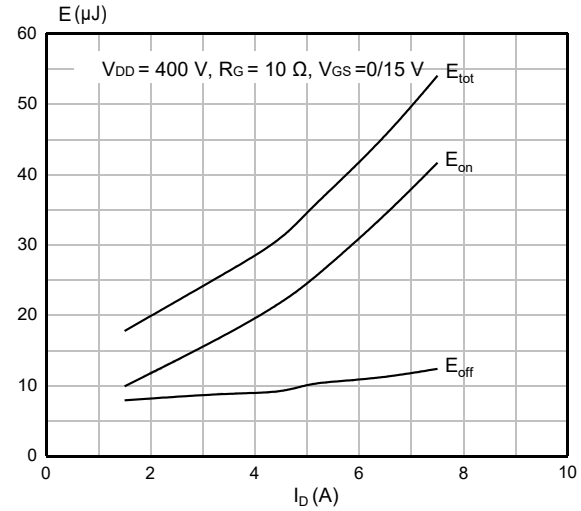


Figure 10. Typical Switching Energy vs. Drain Current

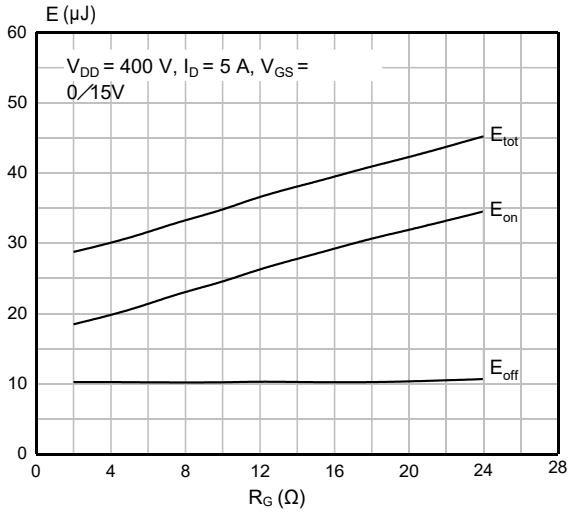


Figure 11.Switching Energy vs. Gate Resistance

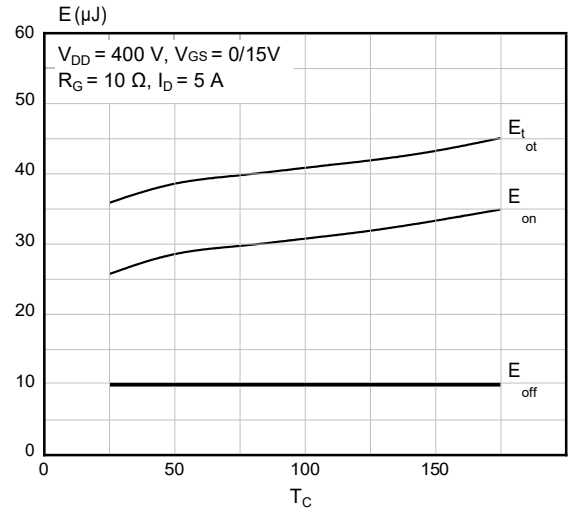


Figure 12. Typical Switching Energy vs. Temperature

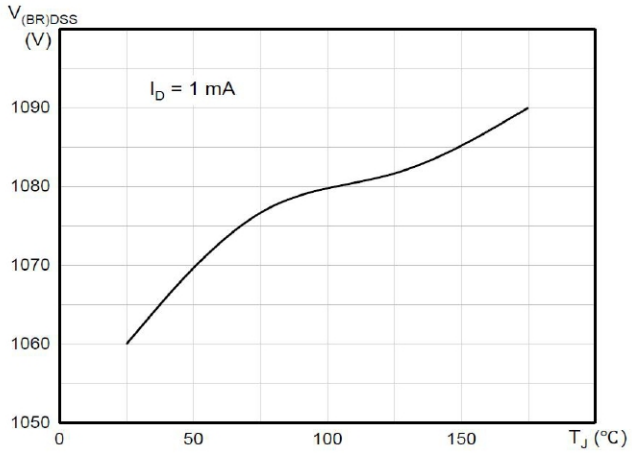


Figure 13. Breakdown Voltage vs. Temperature

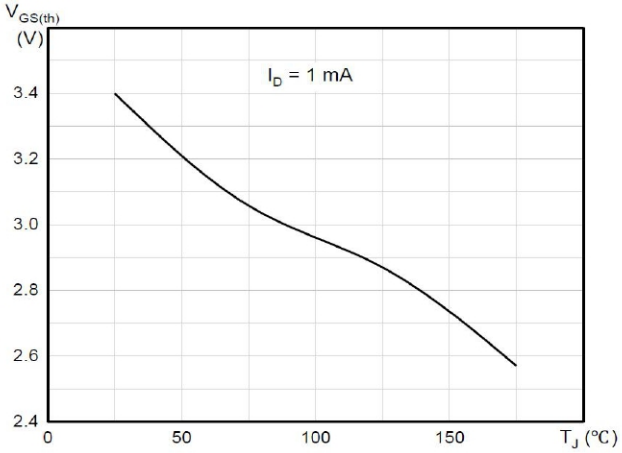


Figure 14. Gate Threshold vs. Temperature

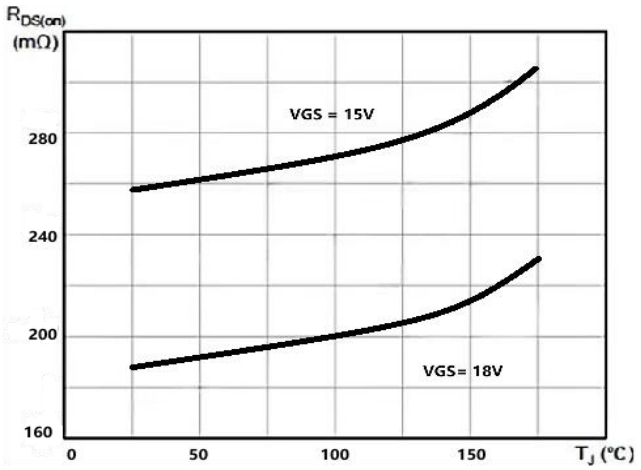


Figure 15. On-Resistance vs. Temperature

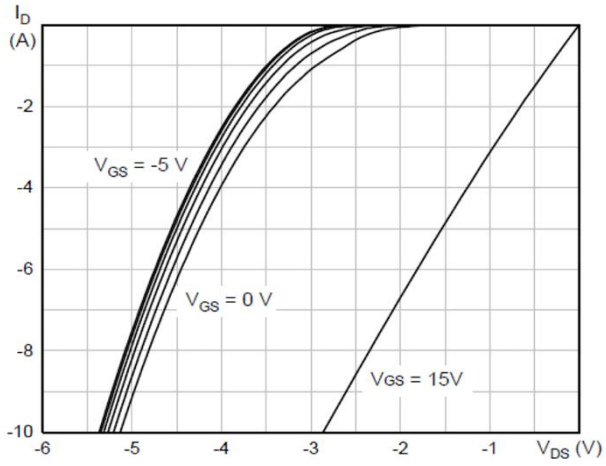


Figure 16. Body Diode Characteristics, T_J = 25°C

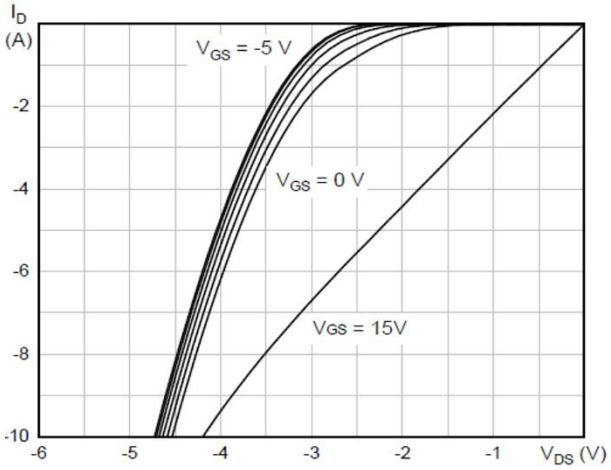
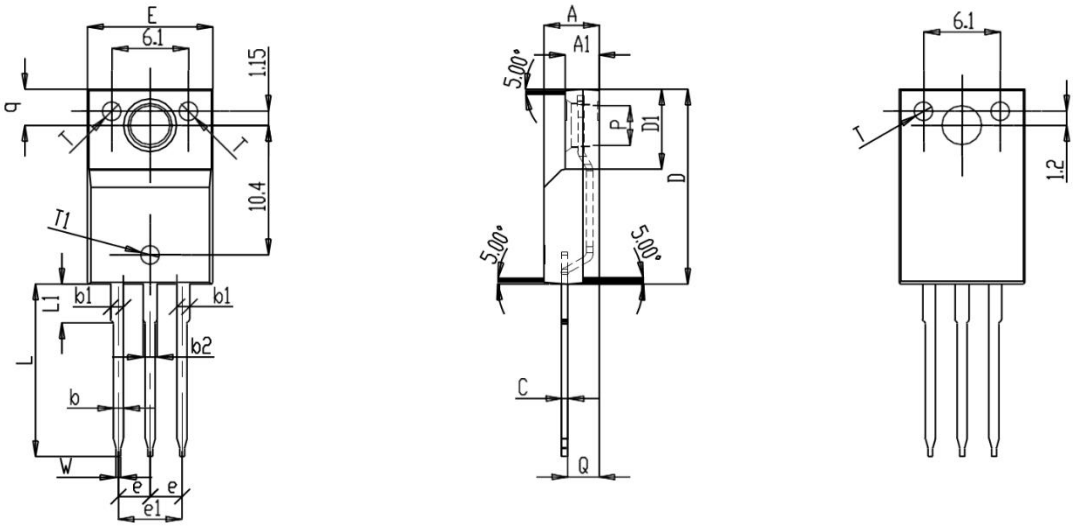


Figure 17. Body Diode Characteristics, T_J = 175°C

Package Dimensions

Package TO-220F



SYMBOL	MILLIMETERS			NOTES	SYMBOL	MILLIMETERS			NOTES
	Normal	MIN.	MAX.			Normal	MIN.	MAX.	
A	4.4	4.2	4.6		e1	5.08	5	5.12	
A1	2.7	2.5	2.9		L	13.90	13.5	14.4	
b	0.8	0.7	0.9		L1	3.12	2.8	3.3	
b1	1.07	0.9	1.3		P	3.14	3.00	3.20	
b2	1.17	1	1.4		Q	2.44	2.3	2.6	
C	0.5	0.4	0.6		q	2.87	2.6	3	
D	15.63	15.4	15.8		W	0.37	0.3	0.5	
D1	6.22	6	6.4		T	1.52	1.3	1.7	
E	10.06	9.7	10.3		T1	1.20	1.1	1.3	
e	2.54	2.5	2.58						

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