

**FH1904G**
**N-Channel Trench Power MOSFET**
**Description**

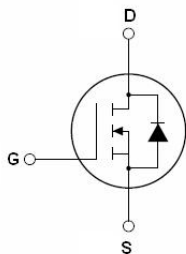
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on state resistance, provide superior switching performance, and with stand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

**General Features**

- ◆  $V_{DSS}=40V$  ,  $I_D=90A$   
 $R_{DS(ON)}=2.4m\Omega$  (Typ) @ $V_{GS}=10V$   
 $R_{DS(ON)}=3.4m\Omega$  (Typ) @ $V_{GS}=4.5V$
- ◆ Improved dv/dt capability
- ◆ Fast switching
- ◆ 100% EAS Guaranteed
- ◆ Green device available

**Applications**

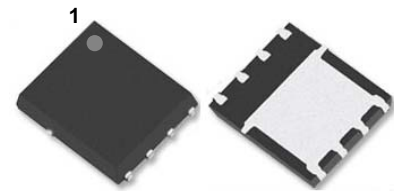
- ◆ Motor Drives
- ◆ UPS
- ◆ DC-DC Converter



Schematic diagram



Marking and pin Assignment



PDFN5X6-8L top and bottom view

**Absolute Maximum Ratings** ( $T_C=25^\circ C$  unless otherwise specified)

Symbol	Parameter	Max.	Units
$V_{DSS}$	Drain-Source Voltage	40	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$I_D^*$	Continuous Drain Current	$T_C = 25^\circ C$	90
		$T_C = 100^\circ C$	54
$I_{DM}^{**}$	Pulsed Drain Current	240	A
$E_{AS}^{***}$	Single Pulsed Avalanche Energy	204	mJ
$P_D$	Power Dissipation	35	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.5	$^\circ C/W$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ C$

Notes :

- \* Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10$  sec
- \*\* Repetitive rating; pulse width limited by max.junction temperature.
- \*\*\* Limited by  $T_{Jmax}$  , starting  $T_J=25^\circ C$ ,  $L = 0.3mH$ ,  $R_G = 25\Omega$ ,  $V_{GS} = 10V$ .

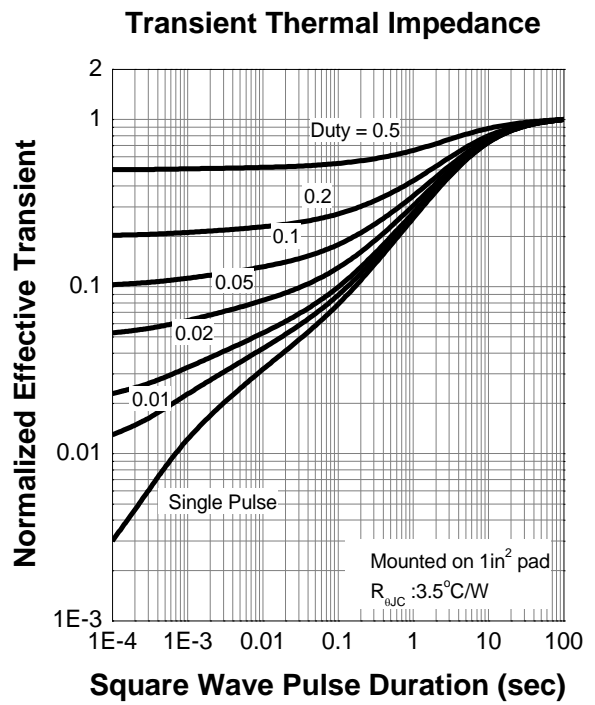
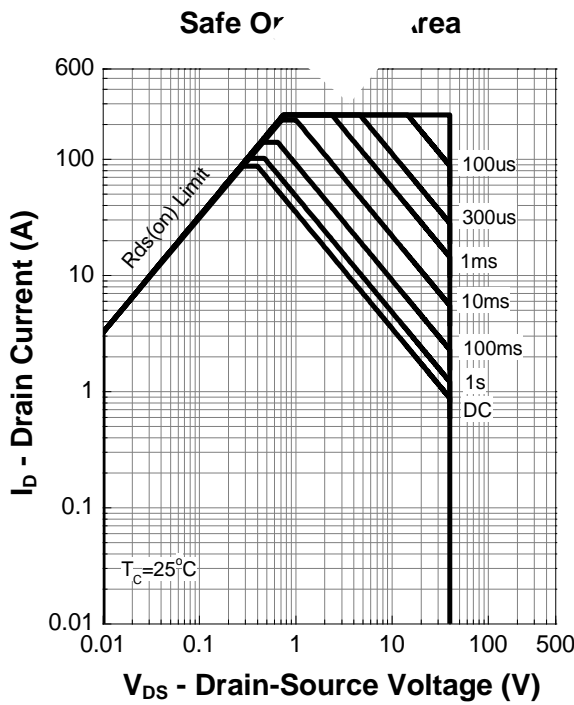
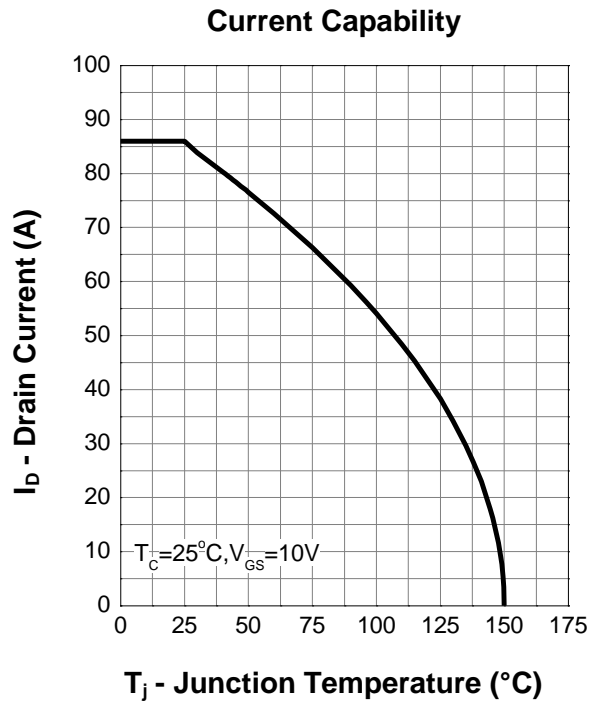
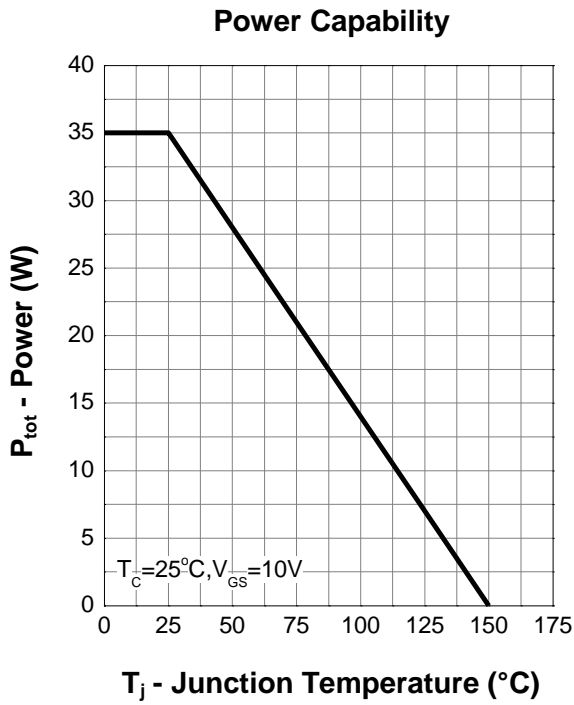
## Electrical Characteristics (T<sub>A</sub> = 25 °C Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	40	45	-	V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 250 μA	1.0	1.5	2.0	V
I <sub>DSS</sub>	Zero Gate Voltage Source Current	V <sub>DS</sub> = 32 V, V <sub>GS</sub> = 0 V	-	-	1	μA
		T <sub>J</sub> = 85 °C	-	-	30	μA
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> = ± 20 V, V <sub>DS</sub> = 0 V	-	-	± 100	nA
R <sub>DS(ON)</sub> <sup>a</sup>	Drain-Source On-State Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A	-	2.4	2.9	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 A	-	3.4	3.9	
<b>Diode Characteristics</b>						
V <sub>SD</sub> <sup>a</sup>	Diode Forward Voltage	I <sub>SD</sub> = 20 A, V <sub>GS</sub> = 0 V	-	-	1.3	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> = 20 A, dI <sub>SD</sub> /dt = 100 A/μs	-	46	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	39	-	nC
<b>Dynamic Characteristics<sup>b</sup></b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 20 V Frequency = 1 MHz	-	2554	-	pF
C <sub>oss</sub>	Output Capacitance		-	754	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	53	-	
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> = 20 V, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 4.5 Ω, R <sub>L</sub> = 1 Ω, I <sub>DS</sub> = 20 A	-	11	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	46	-	
t <sub>d(off)</sub>	Turn-off Delay Time		-	46	-	
t <sub>f</sub>	Turn-off Fall Time		-	32	-	
<b>Gate Charge Characteristics<sup>b</sup></b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 10 V, I <sub>DS</sub> = 20 A	-	48	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	9.3	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	8.2	-	

Notes :

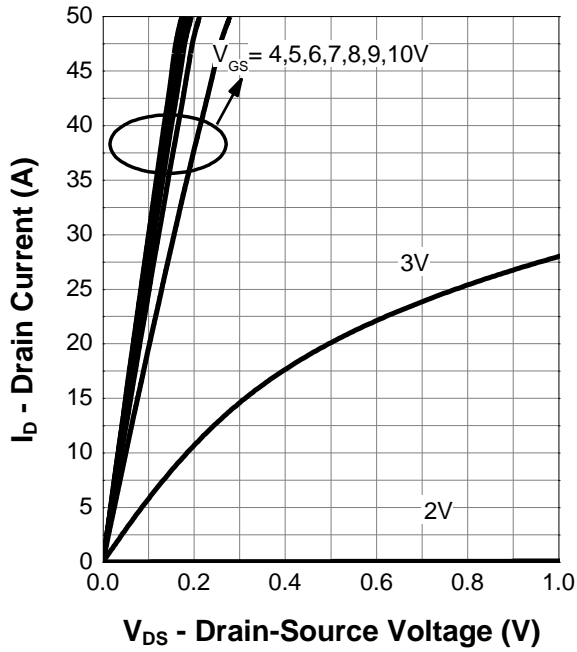
- a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2 %
- b : Guaranteed by design, not subject to production testing

Typical Characteristics (Cont.)

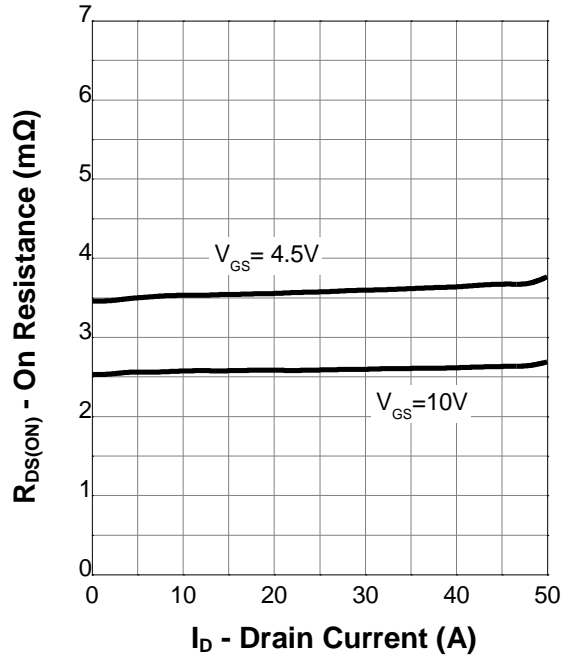


Typical Characteristics (Cont.)

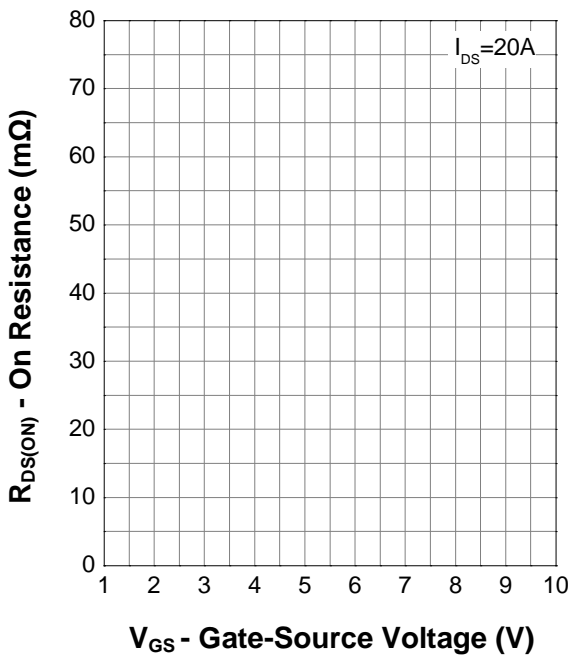
Output Characteristics



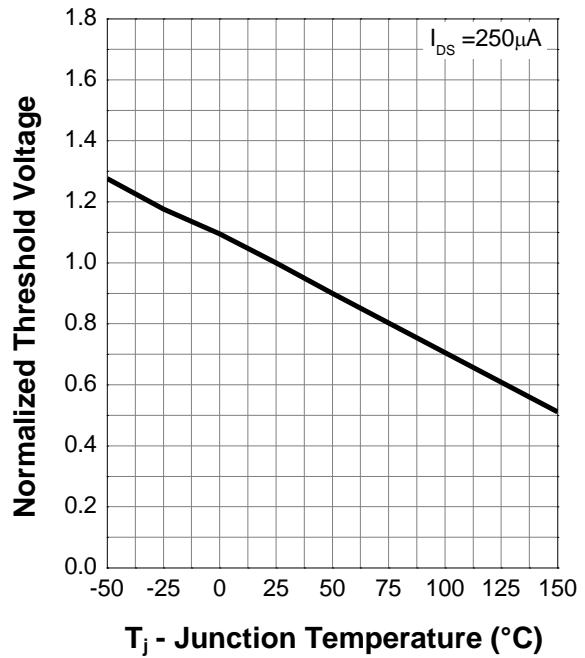
On Resistance



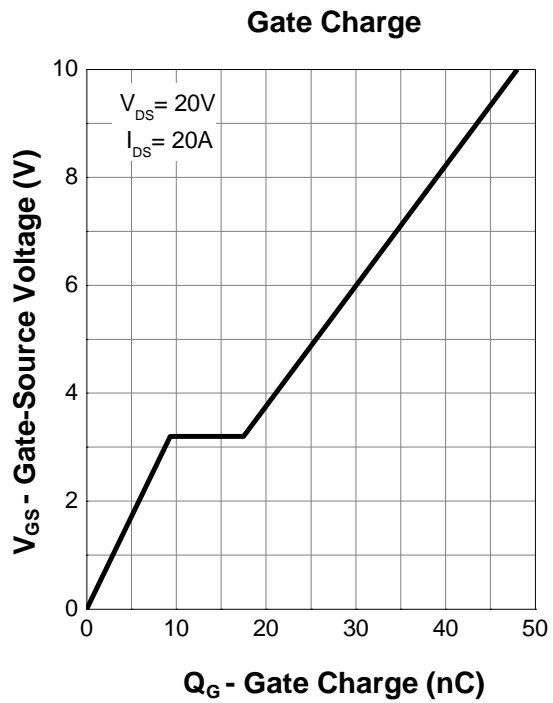
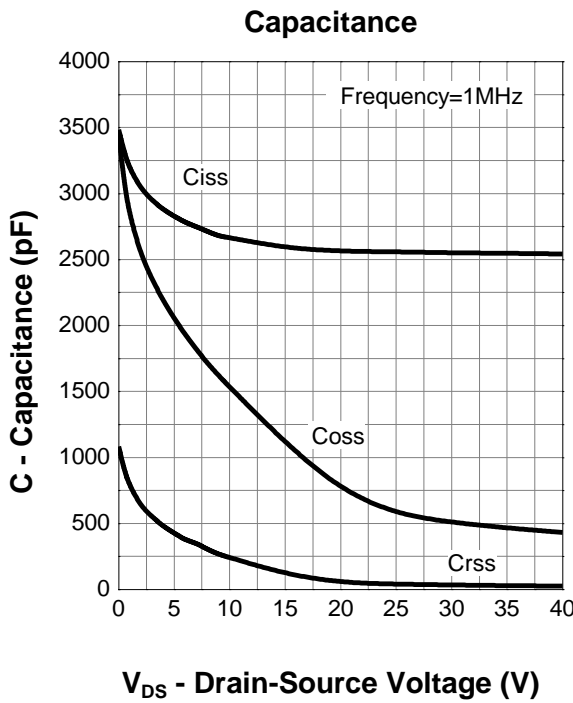
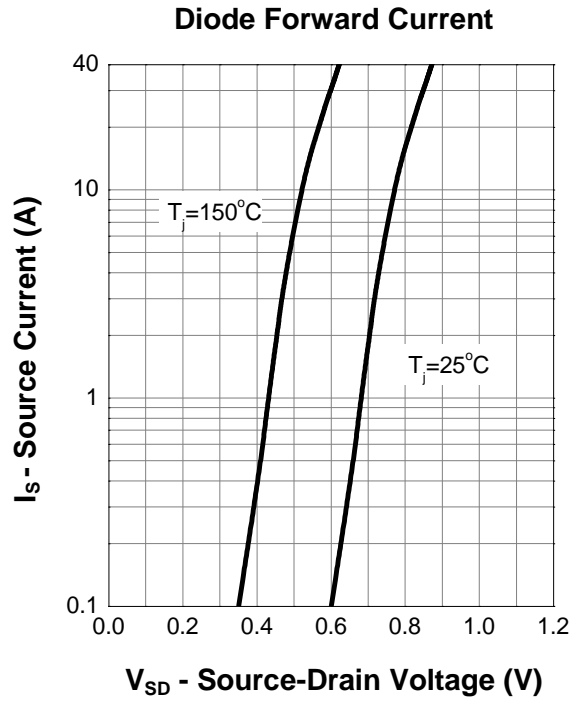
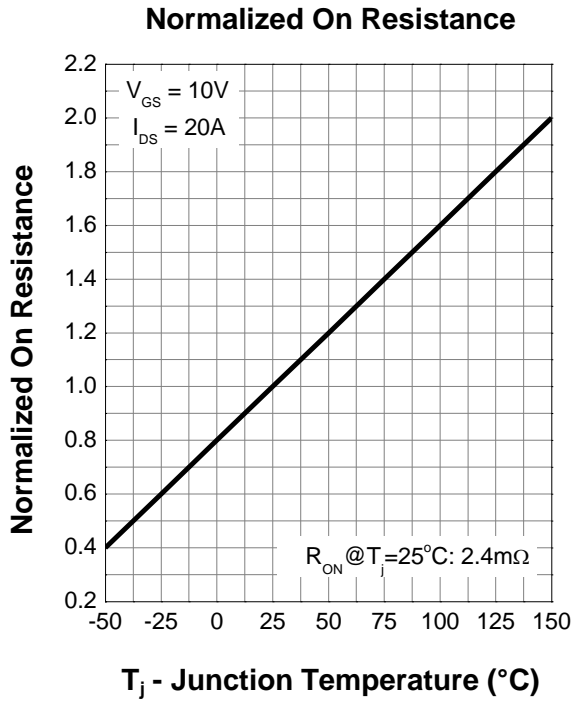
Transfer Characteristics



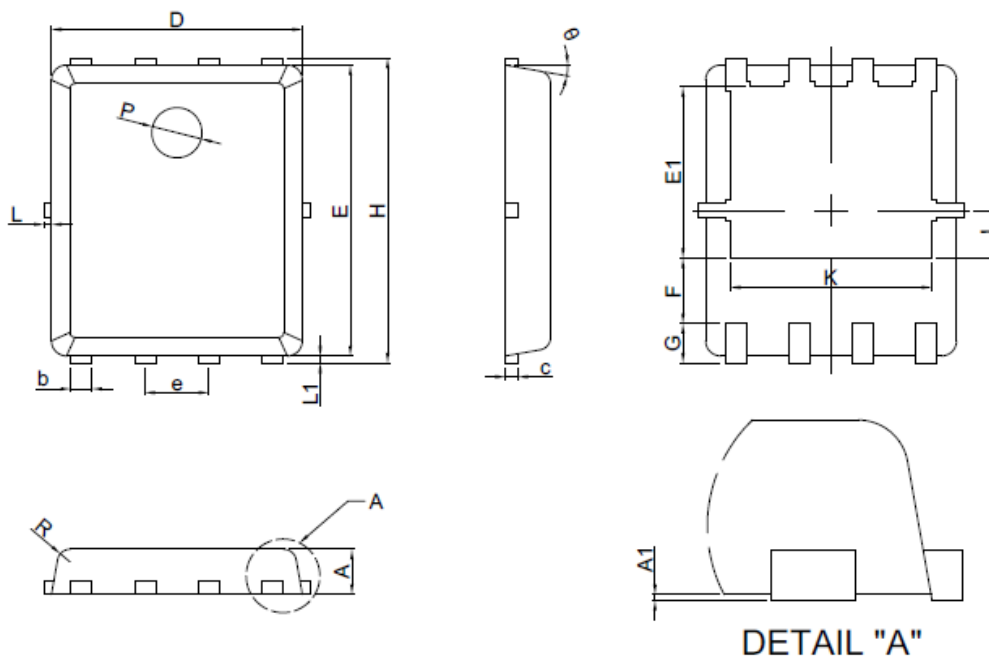
Normalized Threshold Voltage



Typical Characteristics (Cont.)



Package Information : PDFN5x6-8L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	0.80	1.00
A1	0.00	0.05
b	0.35	0.49
c	0.254REF	
D	4.90	5.10
F	1.40REF	
E	5.70	5.90
e	1.27BSC	
H	5.95	6.20
L1	0.10	0.18
G	0.60REF	
K	4.00REF	
L	-	0.15
J	0.95BSC	
P	1.00REF	
E1	3.40REF	
$\theta$	6°	14°
R	0.25REF	