40V N-Channel MOSFETs

PDB40B8AF6H

General 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 withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

BVDSS	RDSON[3]	ID
40V	2.2mΩ	150A

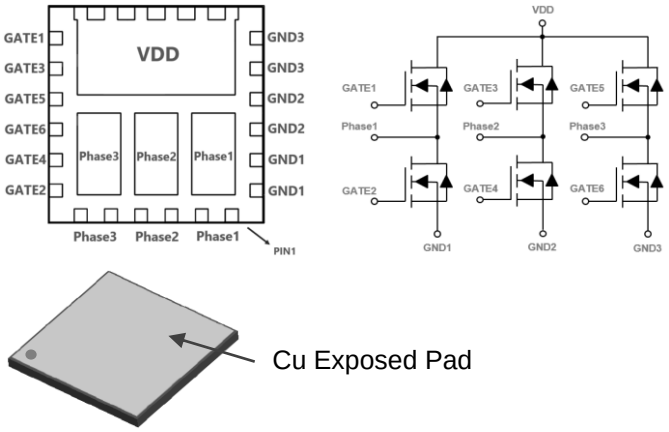
Features

- *40V,150A, RDS(ON) =2.2mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

Applications

- *3-phase Motor Driver*
- *3-phase Invertor*

DFN10X10 6 IN 1 Pin Configuration



Cu Exposed Pad

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	+20 / -12	V
I_D	Drain Current – Continuous (T_C=25℃)	150	A
	Drain Current – Continuous (T_C=100℃)	95	A
I_{DM}	Drain Current – Pulsed[1]	600	A
EAS	Single Pulse Avalanche Energy[2]	320	mJ
IAS	Single Pulse Avalanche Current[2]	80	A
P_D	Power Dissipation (T_C=25℃)	86	W
	Power Dissipation – Derate above 25℃	0.69	W/℃
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	1.45	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	40	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=40V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=32V , V_{GS}=0V , T_J=85℃	---	---	10	uA
$I_{GSS(+)}$	Gate-Source Leakage Current	V_{GS}=20V, V_{DS}=0V	---	---	100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance[3]	V_{GS}=10V , I_D=40A	---	1.8	2.2	mΩ
	Static Drain-Source On-Resistance[4]	V_{GS}=10V , I_D=40A	---	2.2	2.6	mΩ
	Static Drain-Source On-Resistance[5]	V_{GS}=10V , I_D=40A	---	2.8	3.5	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	2	2.8	4	V
gfs	Forward Transconductance	V_{DS}=10V , I_D=5A	---	15	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge[6,7]	V_{DS}=20V , V_{GS}=10V , I_D=70A	---	58.4	88	nC
Q_{gs}	Gate-Source Charge[6,7]		---	14.3	21.5	
Q_{gd}	Gate-Drain Charge[6,7]		---	12	20	
$T_{d(on)}$	Turn-On Delay Time[6,7]	V_{DD}=20V , V_{GS}=10V , R_G=6Ω I_D=70A	---	14.6	---	ns
T_r	Rise Time[6,7]		---	21.5	---	
$T_{d(off)}$	Turn-Off Delay Time[6,7]		---	52	---	
T_f	Fall Time[6,7]		---	83.5	---	
C_{iss}	Input Capacitance	V_{DS}=20V , V_{GS}=0V , F=1MHz	---	3310	4965	pF
C_{oss}	Output Capacitance		---	1090	1650	
C_{rss}	Reverse Transfer Capacitance		---	100	150	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	150	A
I_{SM}	Pulsed Source Current		---	---	300	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1	V
T_{rr}	Reverse Recovery Time	V_R=30V, I_S=10A di/dt=100A/μs , TJ=25℃	---	38	---	ns
Q_{rr}	Reverse Recovery Charge		---	90	---	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=80A.,R_G=25Ω,Starting T_J=25℃.
3. The $R_{DS(ON)}$ value is the position of M1, M2, M3 and M5.
4. The $R_{DS(ON)}$ value is the position of M4.
5. The $R_{DS(ON)}$ value is the position of M6.
6. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
7. Essentially independent of operating temperature.

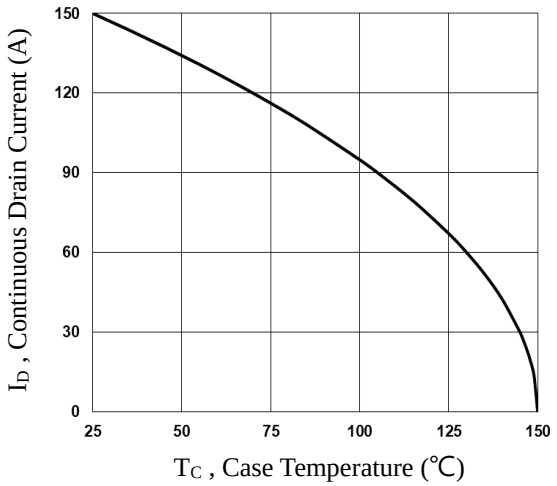


Fig.1 Continuous Drain Current vs. T_C

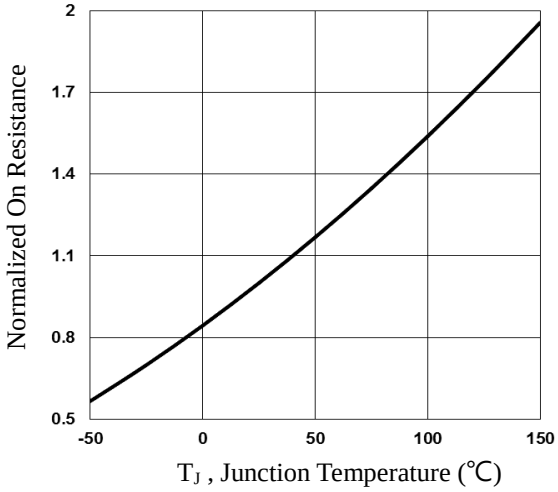


Fig.2 Normalized RDSON vs. TJ

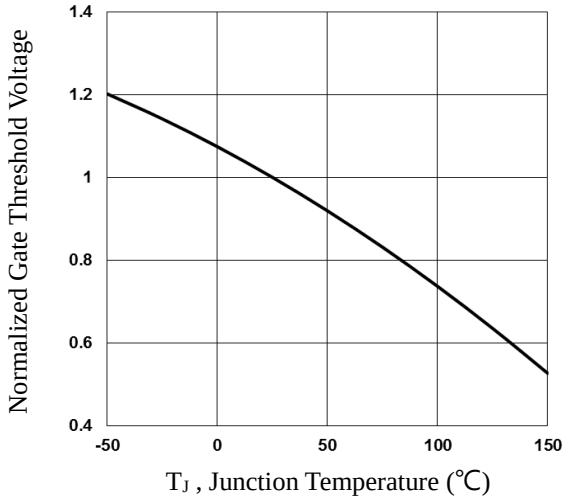


Fig.3 Normalized Vth vs. T_J

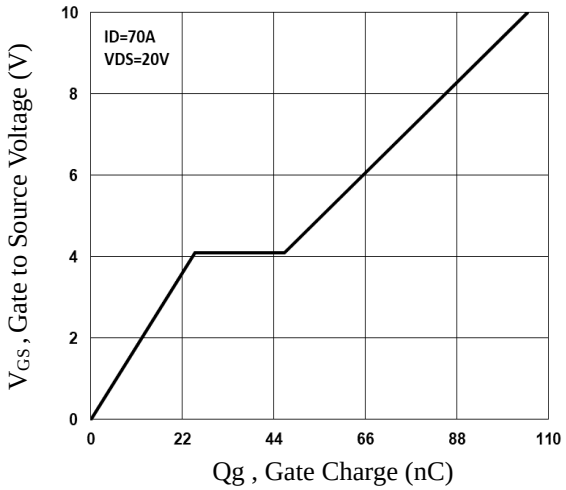


Fig.4 Gate Charge Characteristics

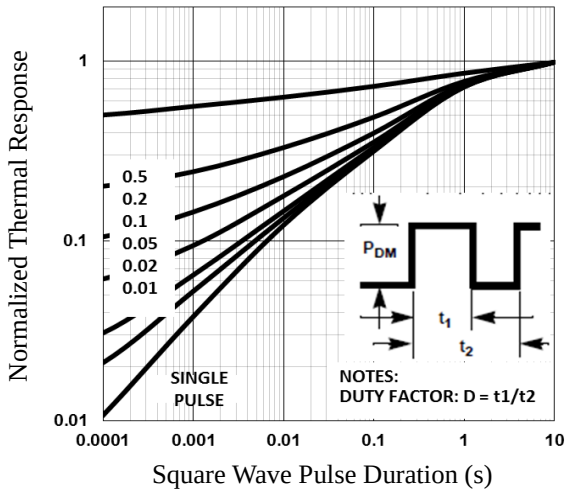


Fig.5 Normalized Transient Impedance

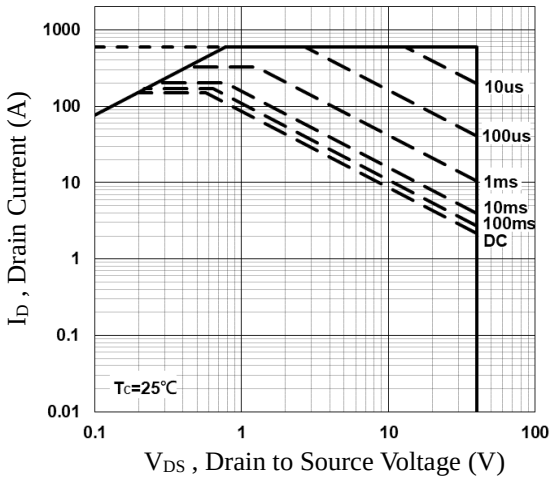


Fig.6 Maximum Safe Operation Area

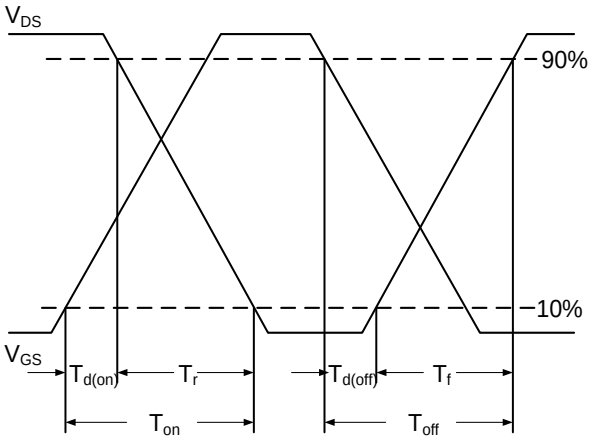


Fig.7 Switching Time Waveform

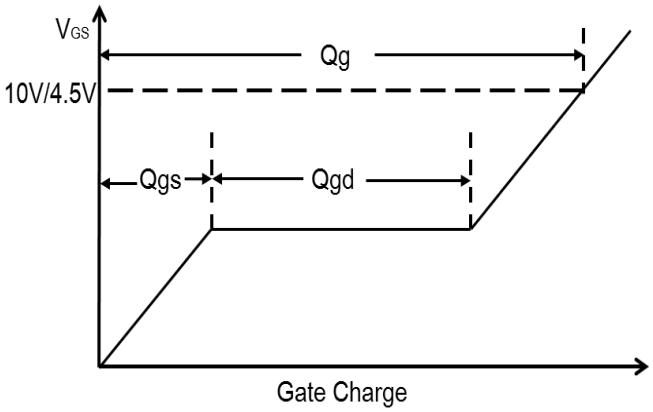
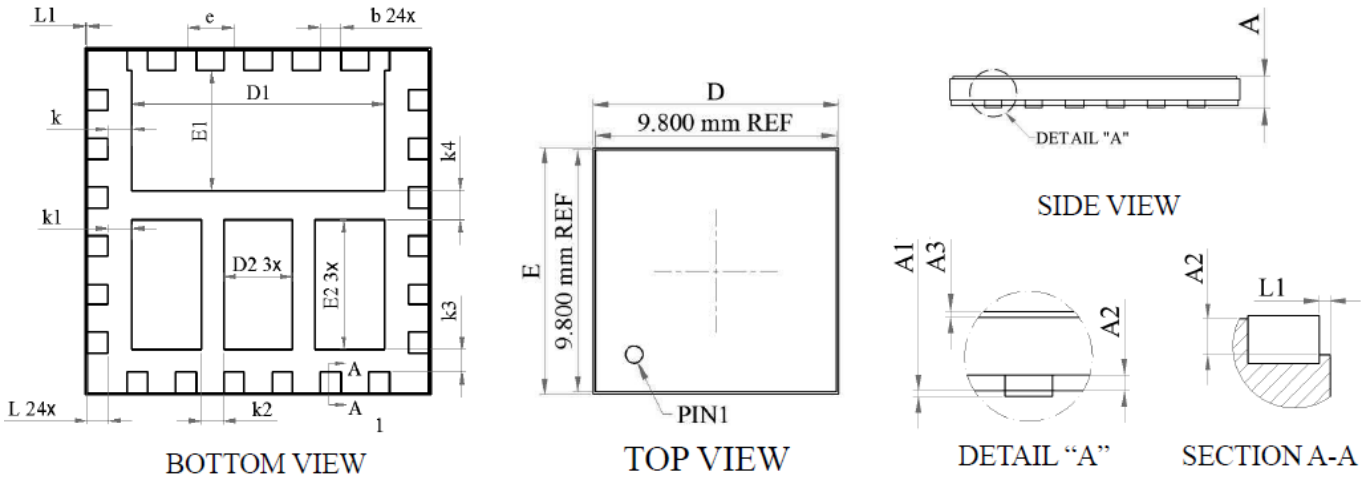


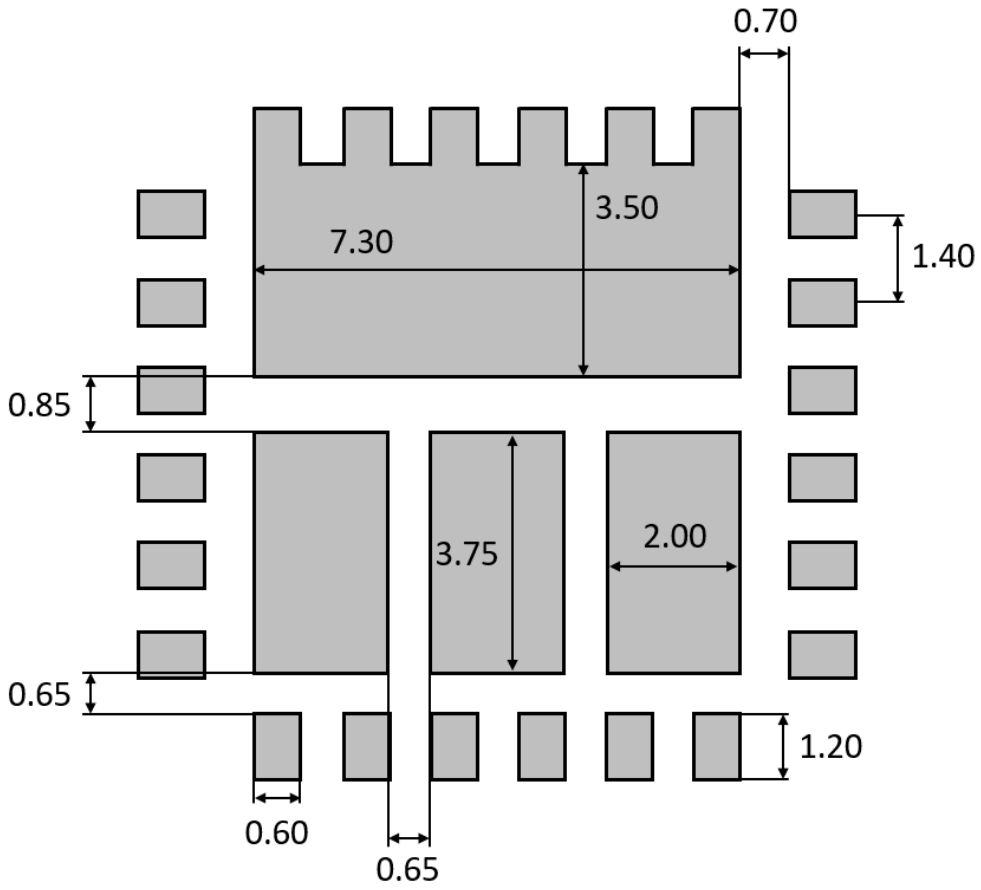
Fig.8 Gate Charge Waveform

DFN10X10 6 IN 1 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Normal	Max	Min	Normal	Max
A	0.950	---	1.050	0.038	---	0.041
A1	---	---	0.005	---	---	0.000
A2	0.080	---	0.250	0.003	---	0.010
A3	0.050	0.075	0.100	0.002	0.003	0.004
D	9.900	10.000	10.100	0.390	0.394	0.398
E	9.900	10.000	10.100	0.390	0.394	0.398
D1	7.200	7.300	7.400	0.283	0.287	0.291
E1	3.350	3.450	3.550	0.132	0.136	0.140
D2	1.900	2.000	2.100	0.075	0.079	0.083
E2	3.650	3.750	3.850	0.144	0.148	0.152
b	0.500	0.600	0.700	0.020	0.024	0.028
L	0.500	0.600	0.700	0.020	0.024	0.028
L1	0.010	0.050	0.090	0.000	0.002	0.004
k	0.700 REF			0.028 REF		
k1	0.700 REF			0.028 REF		
k2	0.650 REF			0.026 REF		
k3	0.650 REF			0.026 REF		
k4	0.850 REF			0.033 REF		
e	1.400 BSC			0.055 BSC		

DFN10X10 6 in 1 RECOMMENDED LAND PATTERN



unit : mm