DEVICE SPECIFICATION

AEQ05DM06AV

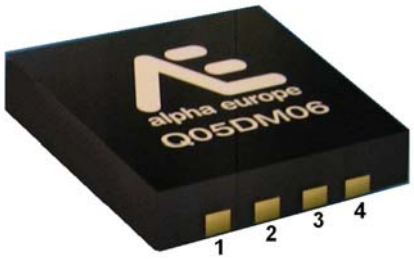
N/P-MOS H-BRIDGE

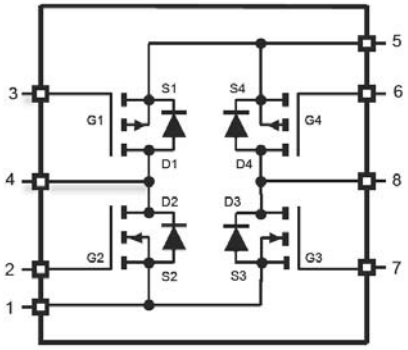
1 Description

Q05DM06 is the first product in alpha europe's new H-bridge driver-family. It is using one of the latest state-of-the-art trench technologies to achieve ultra low resistance RDS(on) for the power MOSFETs. The complementary H-bridge is built of 2 PMOS/NMOS transistor pairs. Based on this trench-technology - the input gate capacity is very low, so high switching frequencies are possible for using in different applications. With this technical performance above and the high density of power integration in a SOT8 pad compatible DFN8 package - it makes the Q05DM06 as an ideal choice for a wide spread of high efficiency application in motor driving, lighting and power management.

2 Features

- Complementary N/P-MOS H-Bridge
- Wide power supply range 5V-60V
- 60V/5.1A/ $R_{DS(on)}$ =34mΩ(typ)
  -60V/-4.2A/ $R_{DS(on)}$ =54mΩ(typ)
- Low QG of 9.86/12.6nC for PMOS/NMOS
  Low CISS of 1447pF/1378pF for PMOS/NMOS
- Low voltage gate drive VGS = ±20V
- RoHS compliant and green product
- Temperature Range -55C…+150C
- DFN8L 5x6x0.75 mm





3 Absolute Maximum Ratings

Symbol	Parameter	AEQ05DM06AV-XXU0 DFN5*6		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage	60	-60	V
I_D	Drain Current - Continuous @ V_{GS}=10V[1] 、T_C=25℃	5.1	-4.2	A
	- Continuous @ V_{GS}=10V[1] 、T_C=70℃	4.2	-3.5	A
I_{DM}	Pulsed Drain Current[2]	15	-12	A
V_{GS}	Gate-Source Voltage	±20	±20	V
P_D	Power Dissipation[4] (T_C= 25°C)	2.2	2.2	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150	-55 to 150	℃

4 Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient [1]	---	328.15	K/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	277.15	K/W

5 N-Channel Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	60	---	---	V
$\triangle BV_{DSS}$ /$\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.063	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=48V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=48V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	---	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.24	---	mV/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=5A	---	34	40	mΩ
		V_{GS}=4.5V , I_D=4A	---	37	48	
gfs	Forward Transconductance	V_{DS}=5V , I_D=4A	---	21	---	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	1378	---	pF
C_{oss}	Output Capacitance		---	86	---	
C_{rss}	Reverse Transfer Capacitance		---	64	---	
Switching Characteristics						
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	3.2	6.4	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=48V , V_{GS}=4.5V , I_D=4A	---	12.6	---	nC
Q_{gs}	Gate-Source Charge		---	3.2	---	
Q_{gd}	Gate-Drain Charge		---	6.3	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=30V , V_{GS}=10V , R_G=3.3Ω I_D=4A	---	8	---	ns
T_r	Rise Time		---	14.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	24.4	---	
T_f	Fall Time		---	4.6	---	
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Continuous Source Current[1,4]	V_G=V_D=0V , Force Current	---	---	5.1	A
I_{SM}	Pulsed Source Current[2,4]		---	---	12	A

V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	V

Note :

1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=22.6A

4.The power dissipation is limited by 150℃ junction temperature

5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

P-Channel Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	-60	---	---	V
$\triangle BV_{DSS}$ /$\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.03	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-48V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=-48V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	---	-2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.56	---	mV/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-4A	---	54	70	mΩ
		V_{GS}=-4.5V , I_D=-3A	---	73	90	
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-3A	---	15	---	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	1447	---	pF
C_{oss}	Output Capacitance		---	97.3	---	
C_{rss}	Reverse Transfer Capacitance		---	70	---	
Switching Characteristics						
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	13.5	27	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-48V , V_{GS}=-4.5V , I_D=-3A	---	9.86	---	nC
Q_{gs}	Gate-Source Charge		---	3.08	---	
Q_{gd}	Gate-Drain Charge		---	2.95	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-15V , V_{GS}=-10V , R_G=3.3Ω I_D=-1A	---	28.8	---	ns
T_r	Rise Time		---	19.8	---	
$T_{d(off)}$	Turn-Off Delay Time		---	60.8	---	
T_f	Fall Time		---	7.2	---	
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	-4.2	A
I_{SM}	Pulsed Source Current[2,6]		---	---	-10.5	A

V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S-1A , T_J=25℃	---	---	-1.2	V

Note :

1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3.The EAS data shows Max. rating . The test condition is V_{DD}=-25V,V_{GS}=-10V,L=0.1mH,I_{AS}=-26.6A

4.The power dissipation is limited by 150℃ junction temperature

5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

6. N-Channel Typical Characteristics

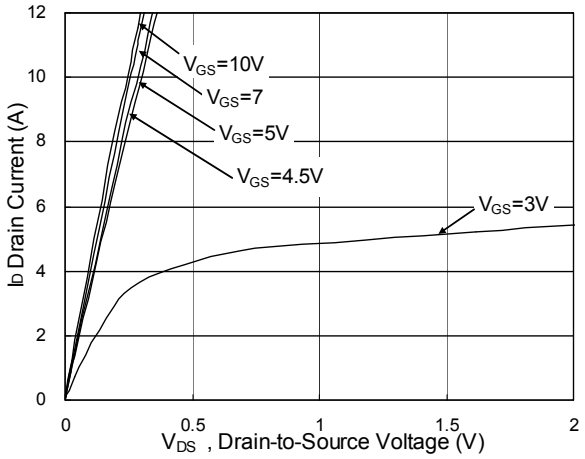


Fig.1 Typical Output Characteristics

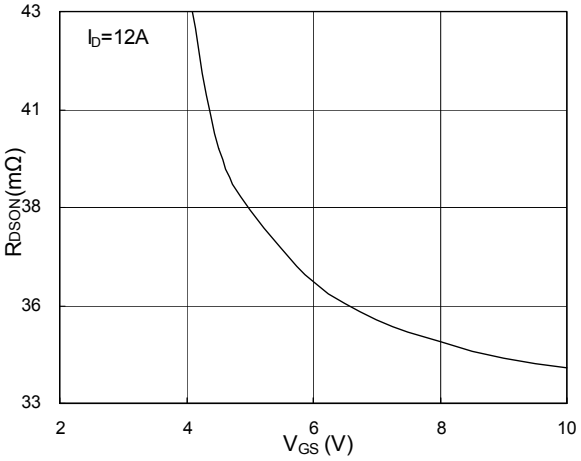


Fig.2 On-Resistance vs. Gate-Source Voltage

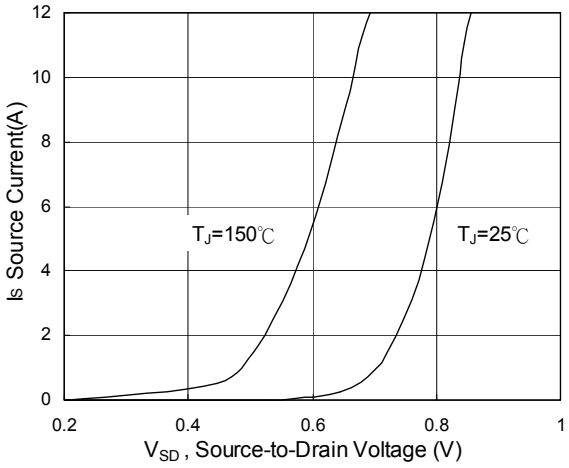


Fig.3 Forward Characteristics of reverse

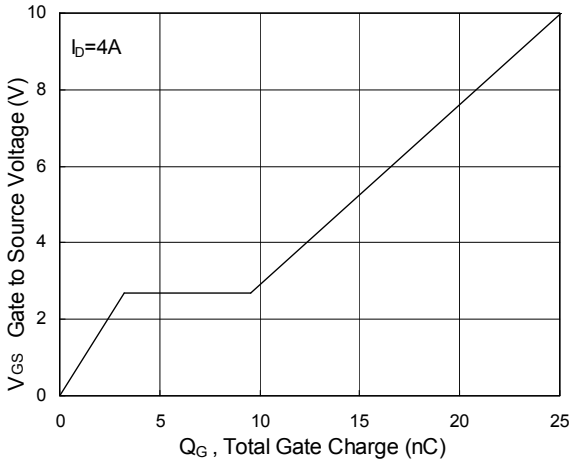


Fig.4 Gate-Charge Characteristics

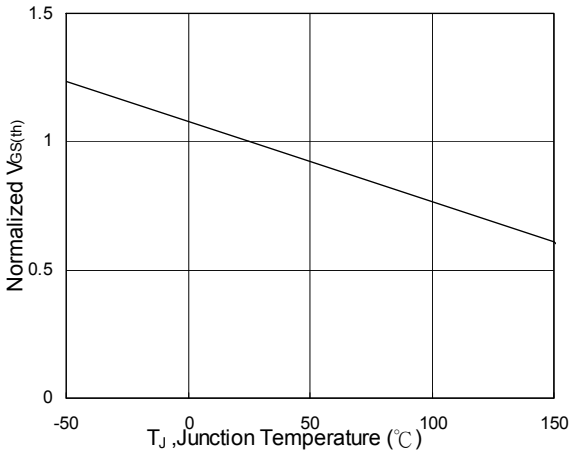


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

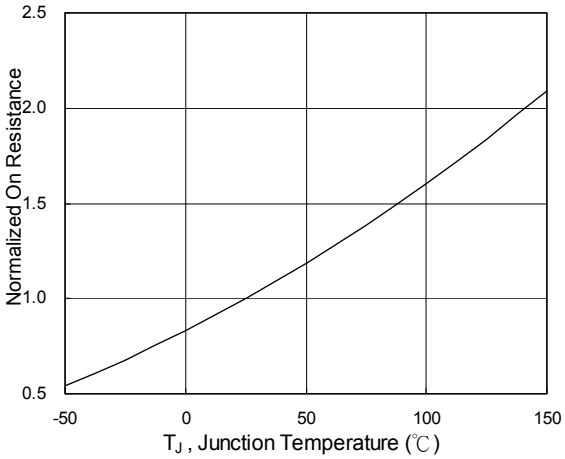


Fig.6 Normalized R_{DSON} vs. T_J

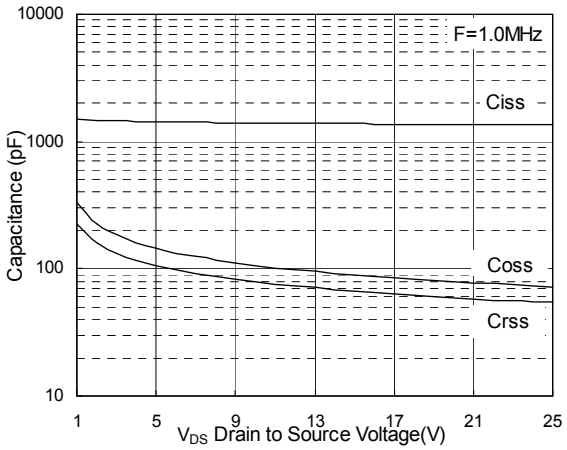


Fig.7 Capacitance

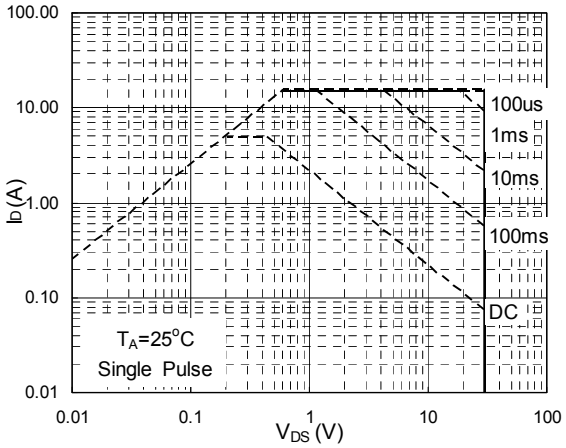


Fig.8 Safe Operating Area

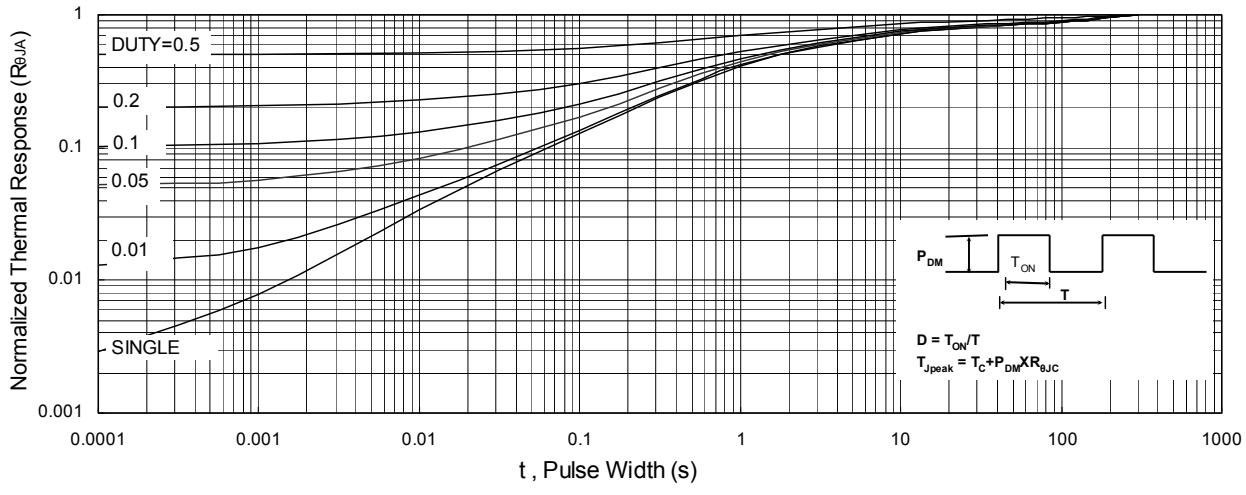


Fig.9 Normalized Maximum Transient Thermal Impedance

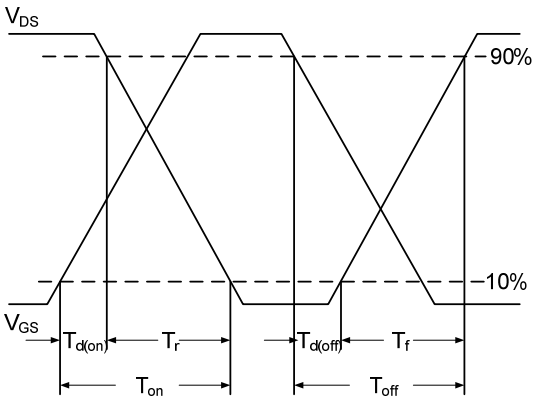


Fig.10 Switching Time Waveform

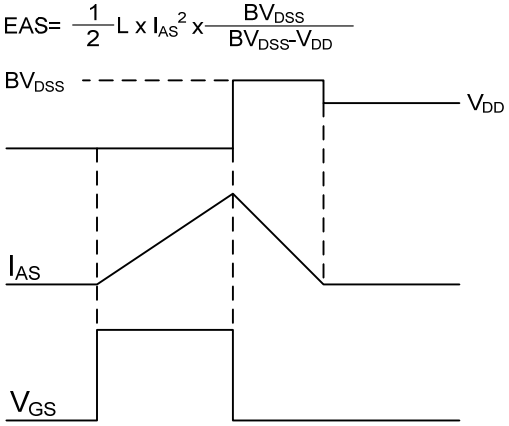


Fig.11 Unclamped Inductive Waveform

P-Channel Typical Characteristics

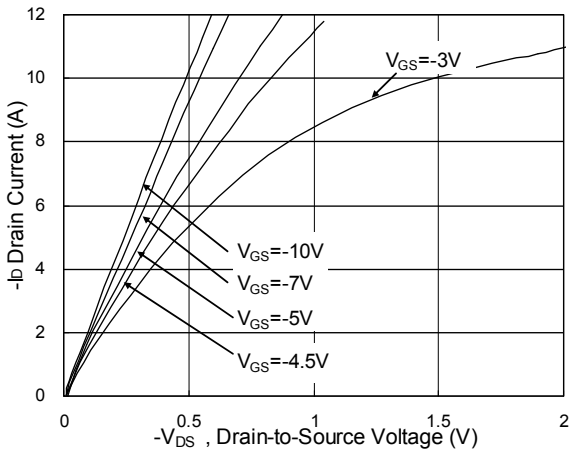


Fig.1 Typical Output Characteristics

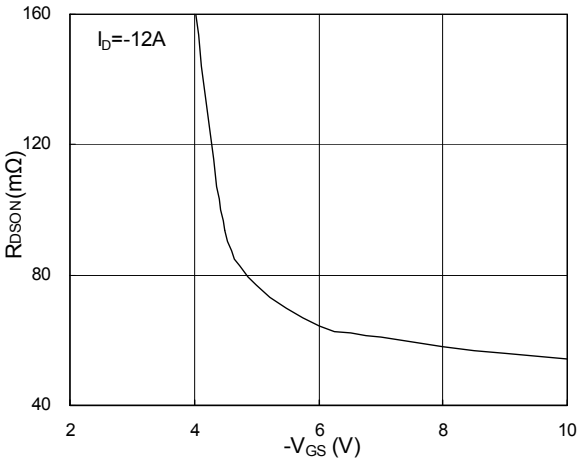


Fig.2 On-Resistance vs. Gate-Source Voltage

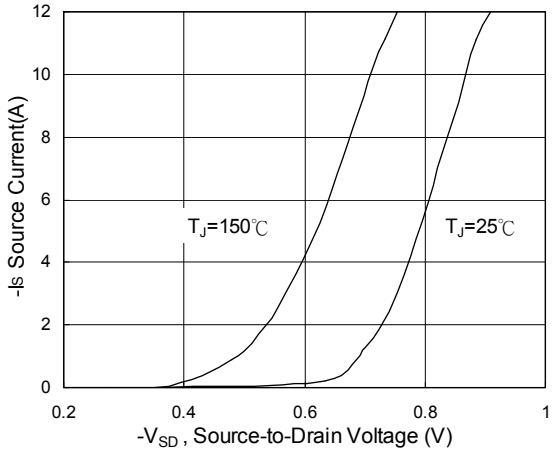


Fig.3 Forward Characteristics of reverse

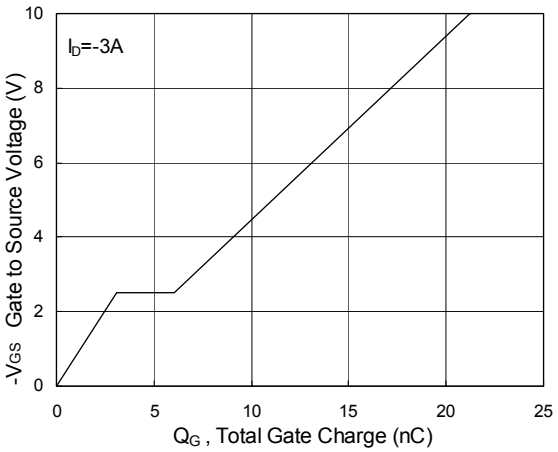


Fig.4 Gate-Charge Characteristics

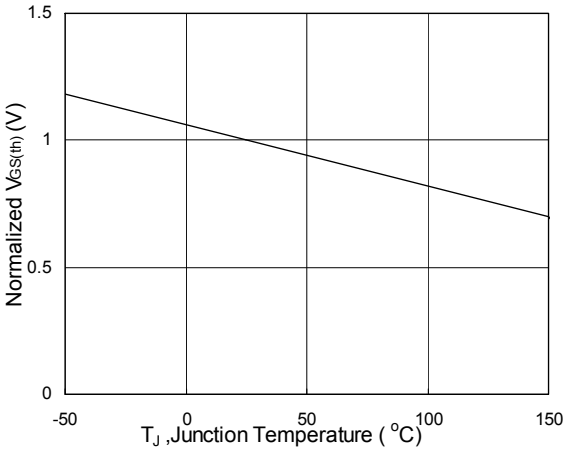


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

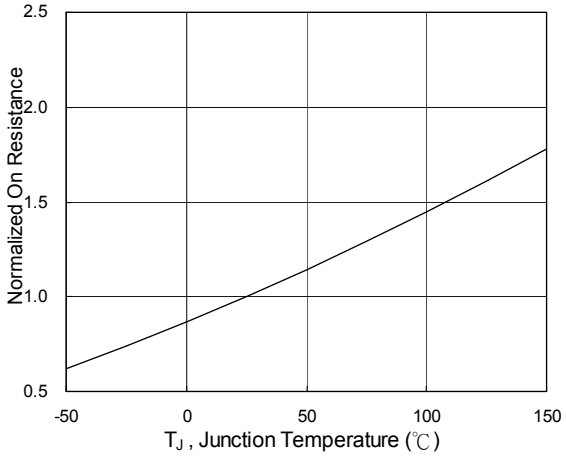


Fig.6 Normalized R_{DSON} vs. T_J

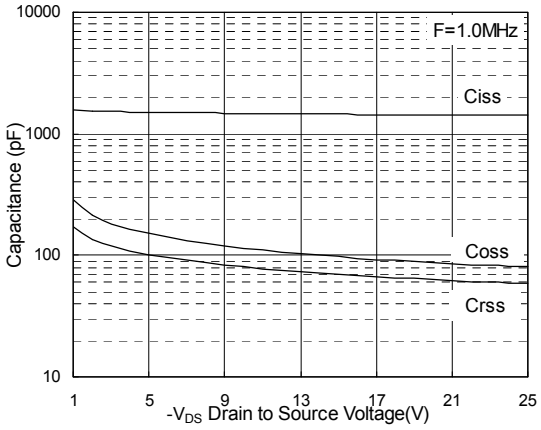


Fig.7 Capacitance

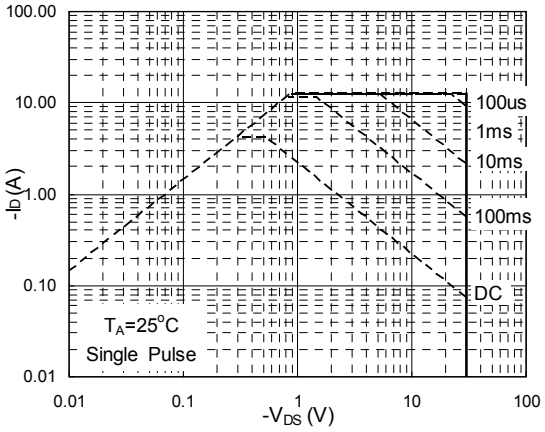


Fig.8 Safe Operating Area

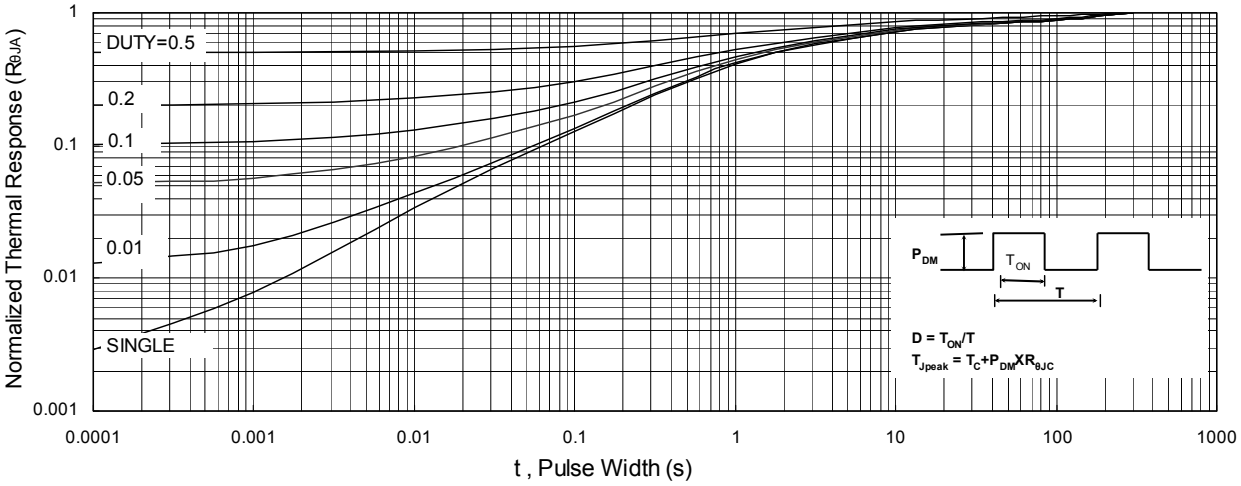


Fig.9 Normalized Maximum Transient Thermal Impedance

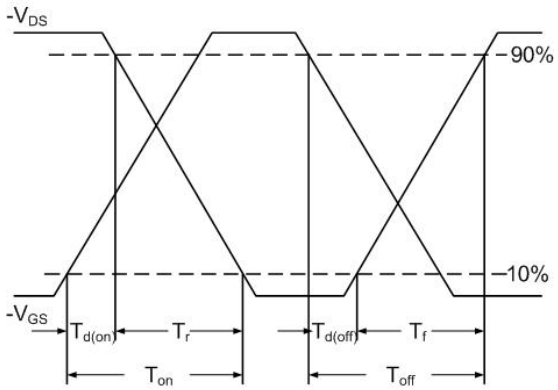


Fig.10 Switching Time Waveform

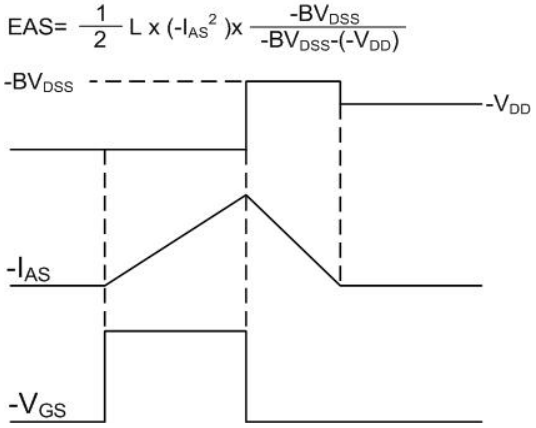
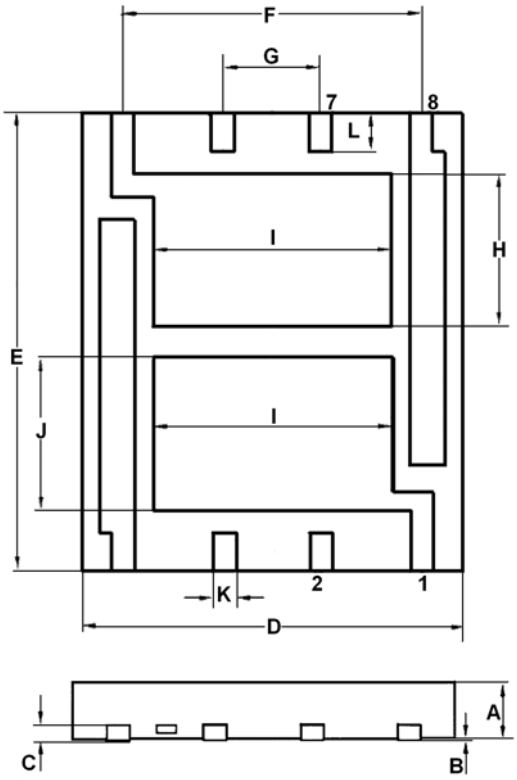


Fig.11 Unclamped Inductive Waveform

7. Package Dimensions

DFN5*6 DIMENSION			
DIM	MILLIMETERS		
	MIN	TYP	MAX.
A	0.70	0.75	0.80
B	--	0.02	0.05
C	0.18	0.20	0.25
E	5.90	6.00	6.10
F	3.81 BSC		
G	1.28 BSC		
H	1.90	2.0	2.10
I	3.02	3.12	3.22
J	1.90	2.0	2.10
K	0.30	0.325	0.35
L	0.49	0.50	0.55



Note

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