TM15P06DF

P -Channel Enhancement Mosfet

General Description

• Low $R_{DS(ON)}$
• RoHS and Halogen-Free Compliant

Applications
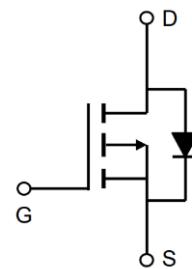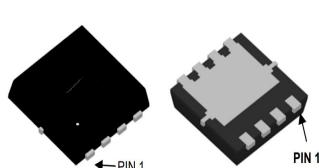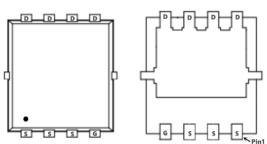
• Load switch
• PWM

General Features

V_{DS} =- 60V I_D =-15A

$R_{DS(ON)}$ = 70mΩ(typ.) @ V_{GS} =-10V

100% UIS Tested
100% R_g Tested

Green
Product

DF:DFN3x3-8L

← PIN 1   PIN 1

D

G

S

Marking:15P06

Absolute Maximum Ratings： (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ -10V[1]	-15	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ -10V[1]	-10	A
I_{DM}	Pulsed Drain Current[2]	-58	A
EAS	Single Pulse Avalanche Energy[3]	18.1	mJ
I_{AS}	Avalanche Current	-13	A
P_D@T_C=25℃	Total Power Dissipation[4]	25	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{θJA}$	Thermal Resistance Junction-Ambient [1]	---	62	℃/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	---	5	℃/W

Electrical Characteristics (T$_J$=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV$_{DSS}$	Drain-Source Breakdown Voltage	V$_{GS}$=0V , I$_D$=-250uA	-60	---	---	V
△BV$_{DSS}$/△T$_J$	BV$_{DSS}$ Temperature Coefficient	Reference to 25℃ , I$_D$=-1mA	---	-0.023	---	V/℃
R$_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V$_{GS}$=-10V , I$_D$=-10A	---	70	87	mΩ
		V$_{GS}$=-4.5V , I$_D$=-6A	---	88	90	
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =-250uA	-1.2	-1.8	-2.5	V
△V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	4	---	mV/℃
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=-24V , V$_{GS}$=0V , T$_J$=25℃	---	---	-1	uA
		V$_{DS}$=-24V , V$_{GS}$=0V , T$_J$=55℃	---	---	-5	
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA
gfs	Forward Transconductance	V$_{DS}$=-5V , I$_D$=-15A	---	12	---	S
Q$_g$	Total Gate Charge (-4.5V)	V$_{DS}$=-15V , V$_{GS}$=-4.5V , I$_D$=-15A	---	6.1	---	nC
Q$_{gs}$	Gate-Source Charge		---	3.1	---	
Q$_{gd}$	Gate-Drain Charge		---	1.8	---	
T$_{d(on)}$	Turn-On Delay Time	V$_{DD}$=-15V , V$_{GS}$=-10V , R$_G$=3.3Ω, I$_D$=-15A	---	2.6	---	ns
T$_r$	Rise Time		---	8.6	---	
T$_{d(off)}$	Turn-Off Delay Time		---	33.6	---	
T$_f$	Fall Time		---	6	---	
C$_{iss}$	Input Capacitance	V$_{DS}$=-15V , V$_{GS}$=0V , f=1MHz	---	985	---	pF
C$_{oss}$	Output Capacitance		---	100	---	
C$_{rss}$	Reverse Transfer Capacitance		---	85	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I$_S$	Continuous Source Current[1,5]	V$_G$=V$_D$=0V , Force Current	---	---	-15	A
I$_{SM}$	Pulsed Source Current[2,5]		---	---	-30	A
V$_{SD}$	Diode Forward Voltage[2]	V$_{GS}$=0V , I$_S$=-1A , T$_J$=25℃	---	---	-1.2	V
t$_{rr}$	Reverse Recovery Time	I$_F$=-15A , dI/dt=100A/μs , T$_J$=25℃	---	6.1	---	nS
Q$_{rr}$	Reverse Recovery Charge		---	1.4	---	nC

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$_{AS}$=-19A
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.

Typical Characteristics
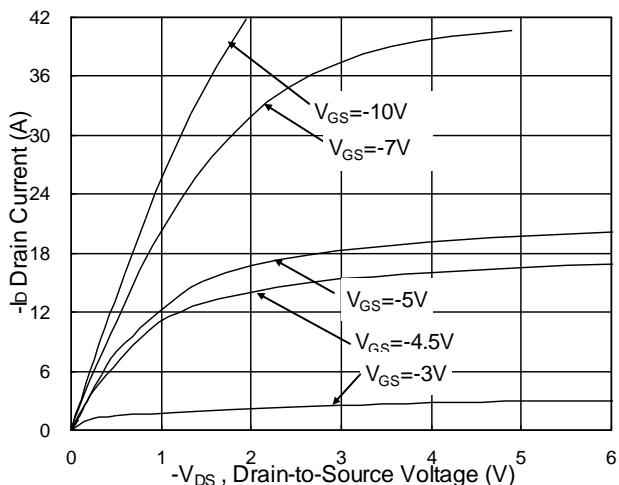

Fig.1 Typical Output Characteristics
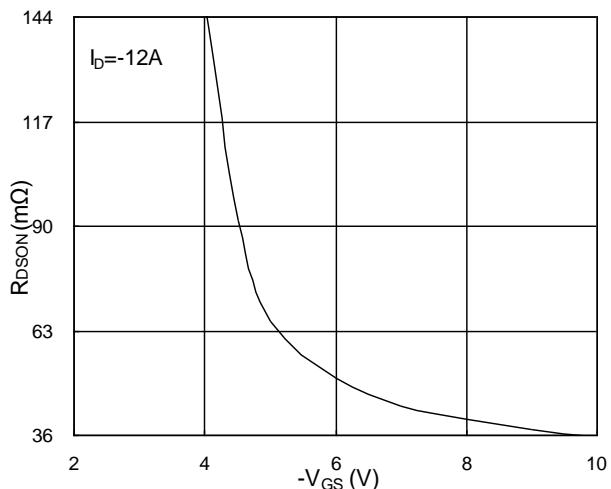
**Fig.2 On-Resistance v.s Gate-Source**
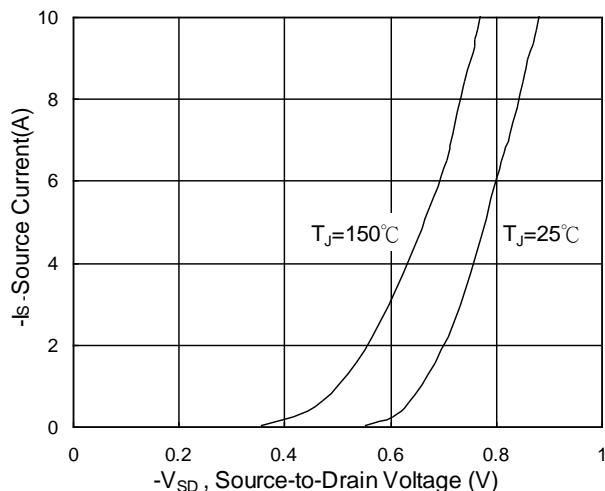
**Fig.3 Forward Characteristics Of Reverse**
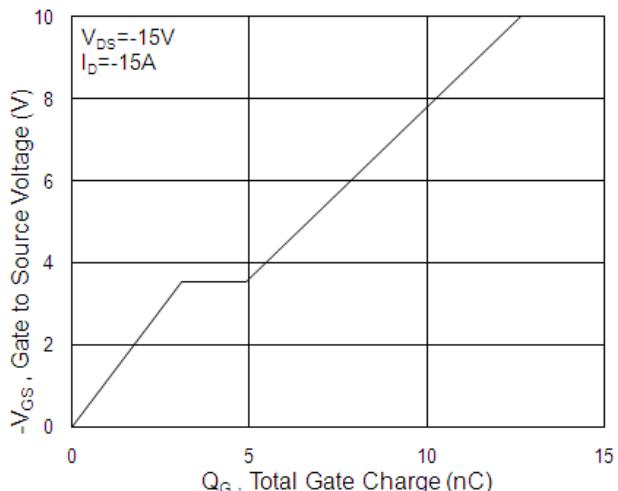
Fig.4 Gate Charge Characteristics
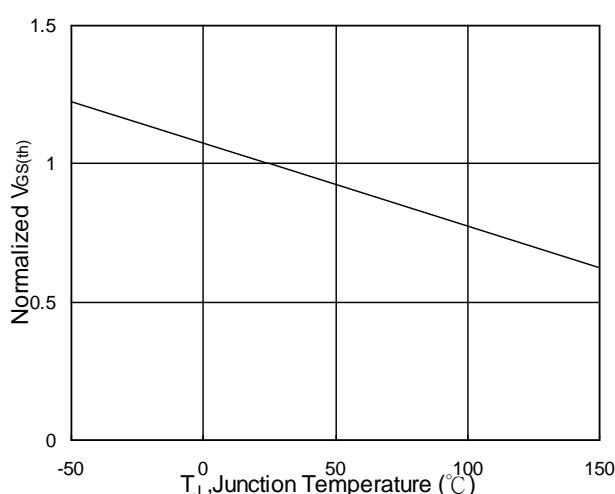

Fig.5 Normalized V$_{GS(th)}$ vs. T$_J$
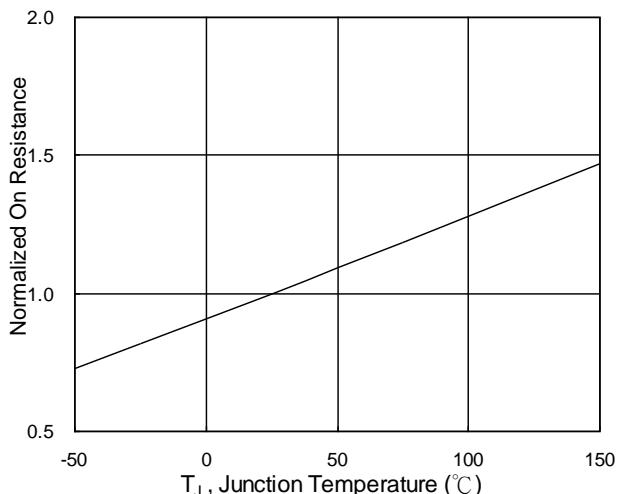
Fig.6 Normalized R$_{DSON}$ vs. T$_J$
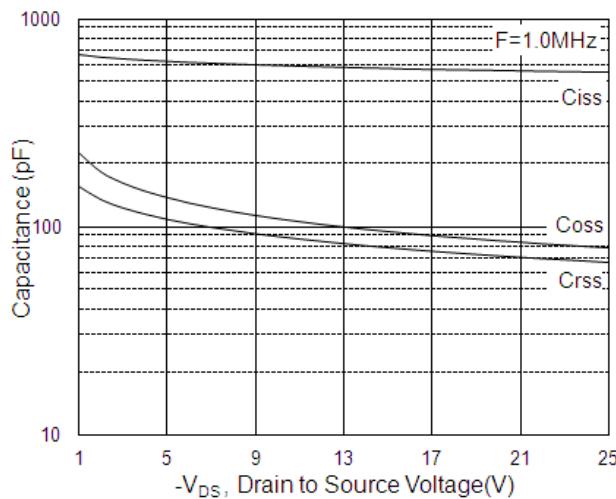
Fig.7 Capacitance
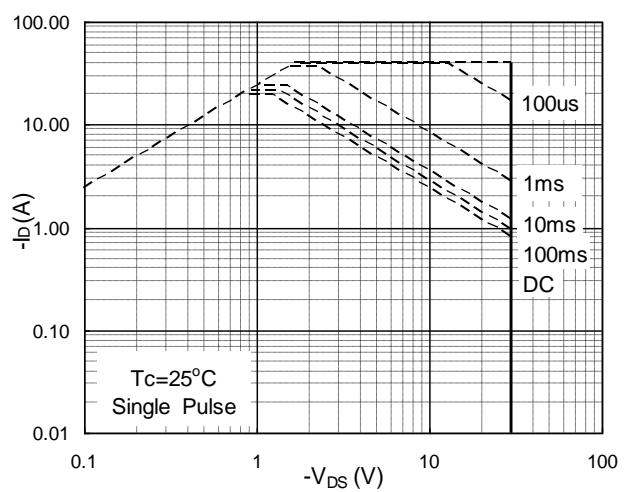
Fig.8 Safe Operating Area

$$D = T_{ON}/T$$

$$T_J peak = T_C + P_{DM} \times R_{\theta JC}$$
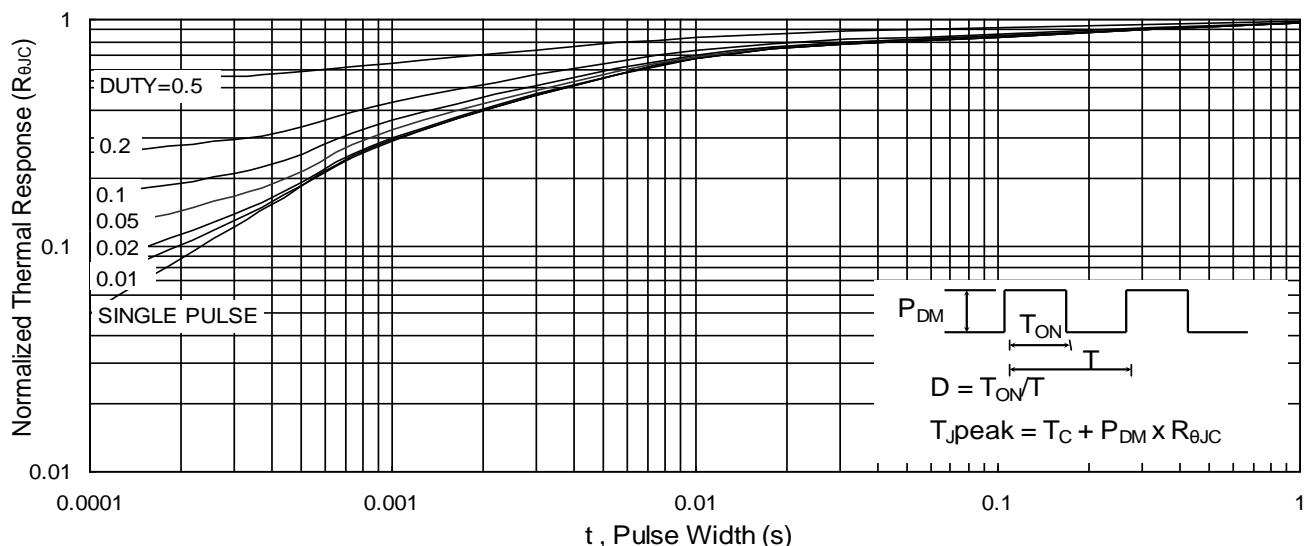
Fig.9 Normalized Maximum Transient Thermal Impedance

$$EAS = \frac{1}{2} L \times (-I_{AS}^2) \times \frac{-BV_{DSS}}{-BV_{DSS}-(-V_{DD})}$$
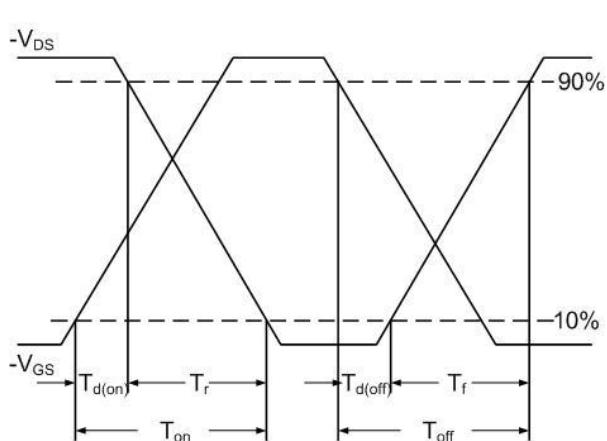
Fig.10 Switching Time Waveform
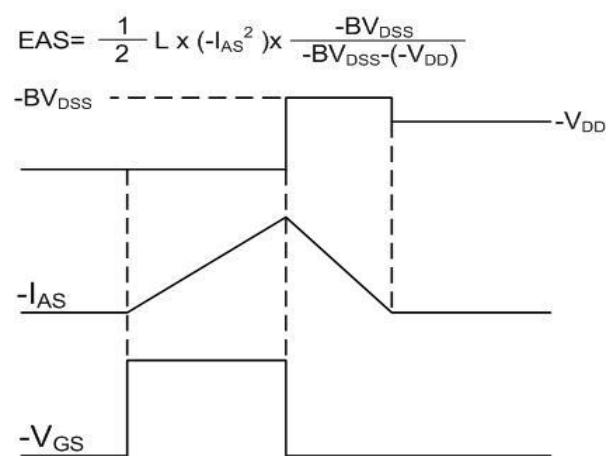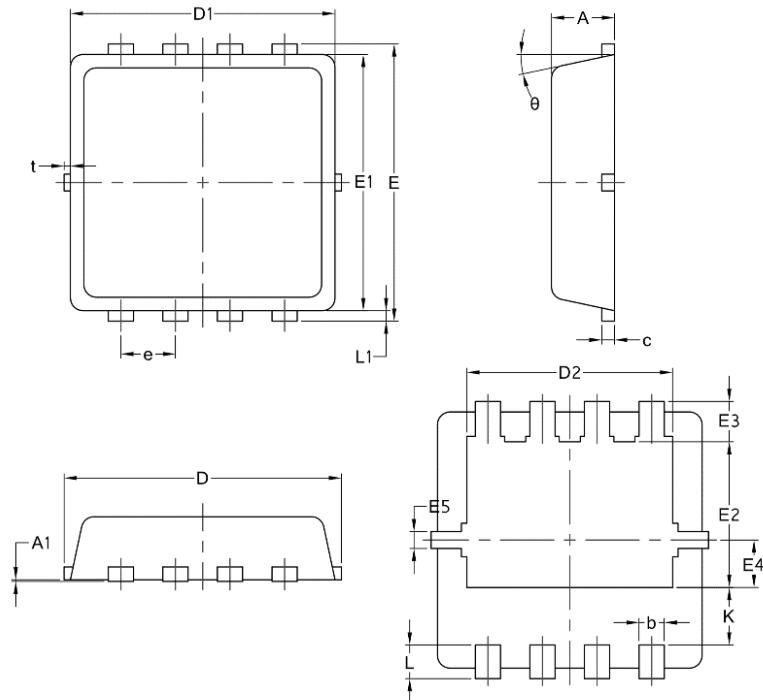
Fig.11 Unclamped Inductive Switching Waveform

Package Mechanical Data:DFN3x3-8L

Symbol	Common mm		
	Mim	Nom	Max
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.59	0.69	0.89
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
t	0	0.075	0.13
Φ	10	12	14