

TM20H04DF

N+N-Channel Enhancement Mosfet

General Description

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

Applications

- Load switch
- PWM

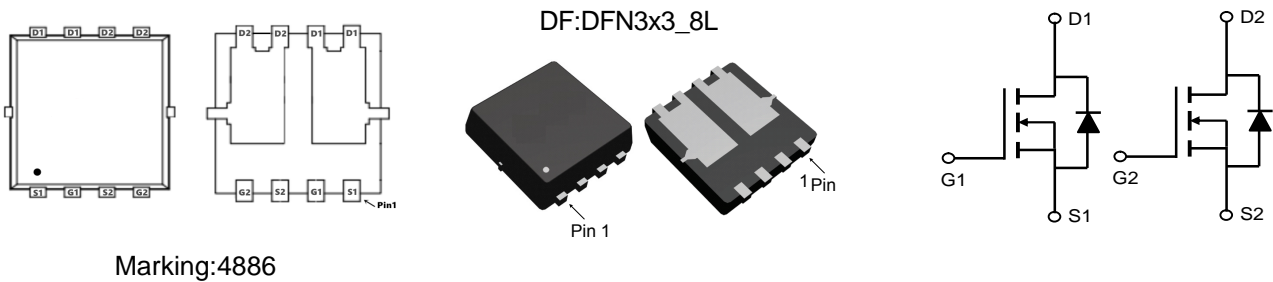
Product Summary

$V_{DS} = 40V$ $I_D = 20A$

$R_{DS(ON)} = 17 m\Omega$ (Typ.) @ $V_{GS} = 10V$

100% UIS Tested

100% R_g Tested



Absolute Maximum Ratings ($T_A = 25^\circ C$ Unless Otherwise Noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	20	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	14	A
I_{DM}	Pulsed Drain Current ²	75	A
EAS	Single Pulse Avalanche Energy ³	22.1	mJ
I_{AS}	Avalanche Current	10	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation ⁴	31.3	W
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ⁴	2	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) ¹	---	60	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	5.5	$^\circ C/W$



TM20H04DF

N+N-Channel Enhancement Mosfet

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	40	---	---	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =6A	---	17	24	mΩ
		V _{GS} =4.5V, I _D =5A	---	25	33	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.0	1.5	2.5	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =32V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =32V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =12A	---	30	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	2.1	---	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =32V, V _{GS} =4.5V, I _D =6A	---	3.8	---	nC
Q _{gs}	Gate-Source Charge		---	2.8	---	
Q _{gd}	Gate-Drain Charge		---	1.1	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =20V, V _{GS} =10V, R _G =3.3Ω I _D =1A	---	12.2	---	ns
T _r	Rise Time		---	5.3	---	
T _{d(off)}	Turn-Off Delay Time		---	18	---	
T _f	Fall Time		---	9	---	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	376	---	pF
C _{oss}	Output Capacitance		---	240	---	
C _{rss}	Reverse Transfer Capacitance		---	19	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	---	---	20	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1.2	V
t _{rr}	Reverse Recovery Time	I _F =6A, dI/dt=100A/μs, T _J =25°C	---	20	---	nS
Q _{rr}	Reverse Recovery Charge		---	35	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch² 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}=10A
- 4.The power dissipation is limited by 150°C 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

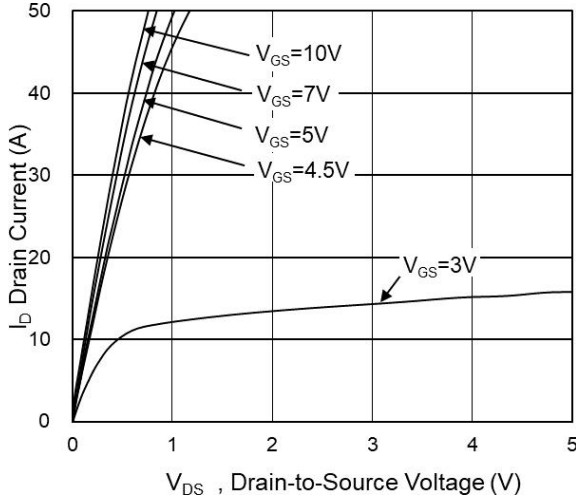


Fig.1 Typical Output Characteristics

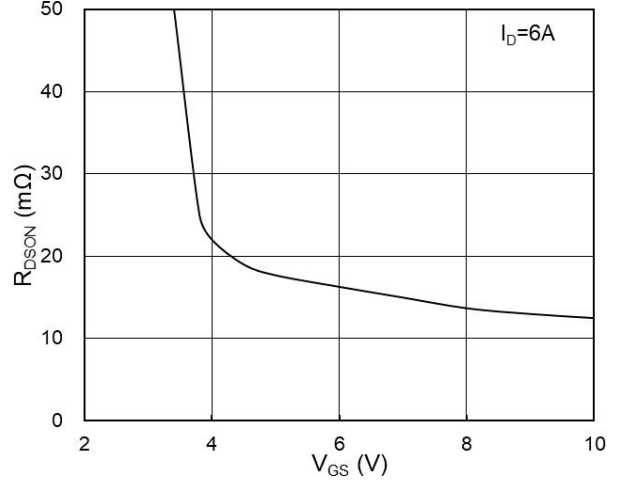


Fig.2 On-Resistance vs G-S Voltage

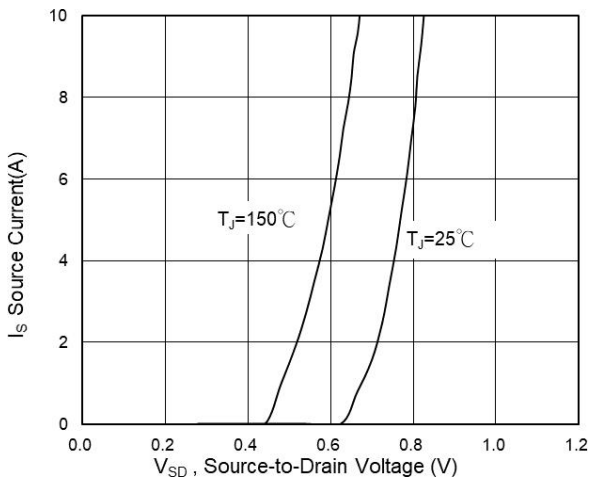


Fig.3 Source Drain Forward Characteristics

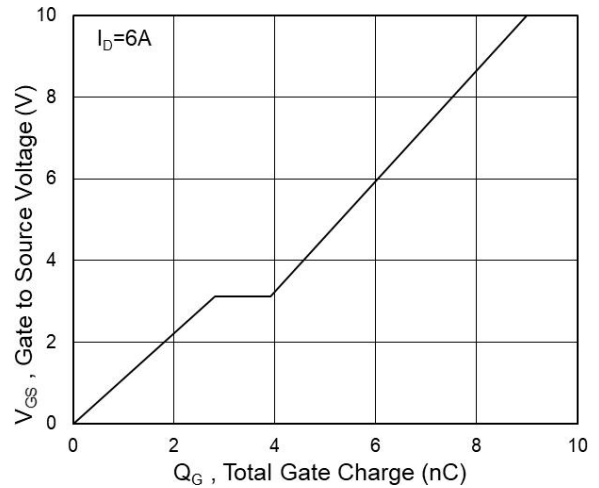


Fig.4 Gate-Charge Characteristics

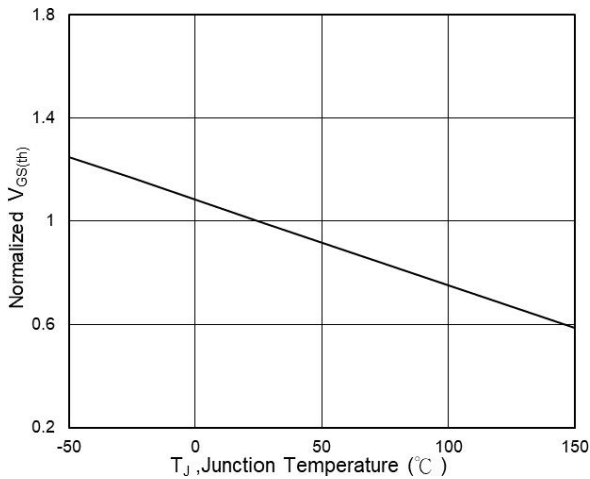


Fig.5 Normalized $V_{GS(th)}$ vs T_J

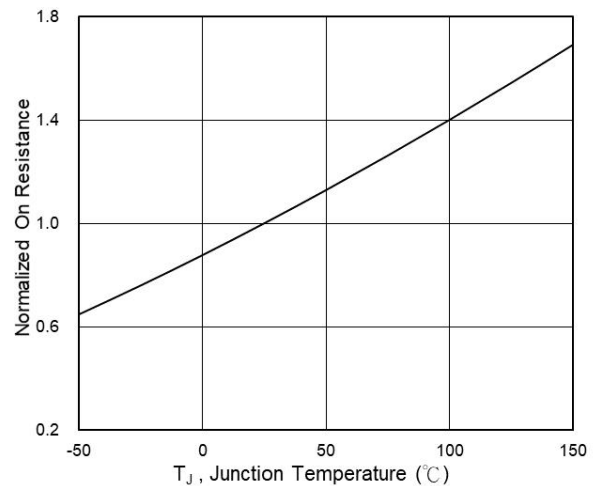


Fig.6 Normalized R_{DSON} vs T_J

TM20H04DF

N+N-Channel Enhancement Mosfet

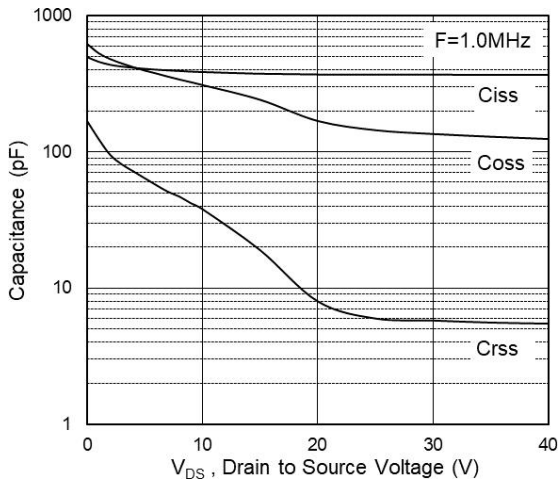


Fig.7 Capacitance

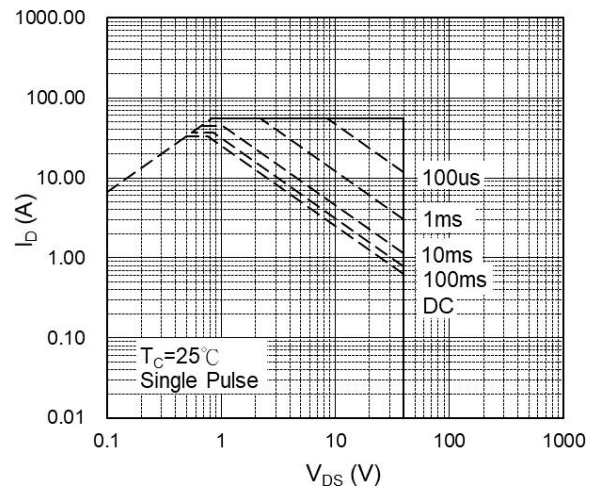


Fig.8 Safe Operating Area

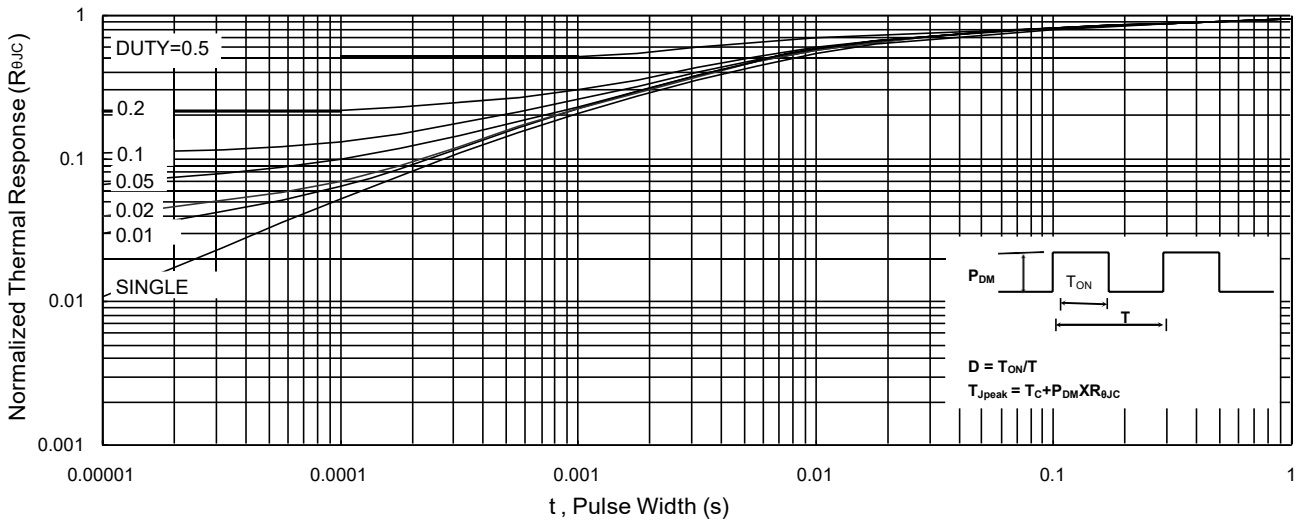


Fig.9 Normalized Maximum Transient Thermal Impedance

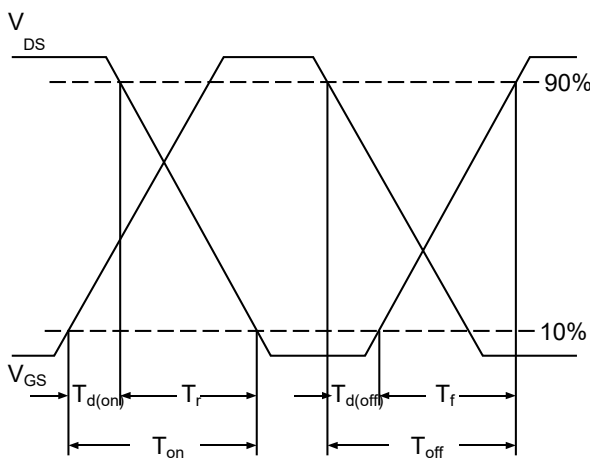


Fig.10 Switching Time Waveform

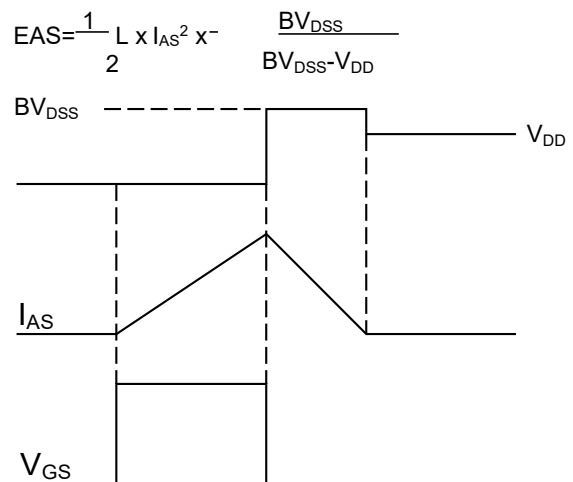


Fig.11 Unclamped Inductive Switching Waveform

Package Mechanical Data:DFN3x3-8L

Symbol	Common		
	Mm		
	Min	Nom	Max
	ìX óì	ìX ó ñ	ìX ó ñ
í	l	l	ìX ì ñ
	ìX ñ	ìX ì ì	ìX ò
	ìX í ð	ìX í ñ î	ìX î ì
	ïX î ì	ïX î ì	ïX ð ñ
í	ïX ì ñ	ïX í ñ	ïX î ñ
î	ìX ò ð	ìX ì ð	ìX î ð
ï	îX î ì	îX ð ñ	îX ò ì
	ïX î ì	ïX î ì	ïX ð ì
í	îX ò ñ	ïX ì ñ	ïX í ñ
î	ìX ò ì	ìX ó ð	ìX ò ì
ï	ìX î ò	ìX ð ò	ìX ò ñ
ð	ìX î ó	ìX ñ ó	ìX ó ó
ñ	ìX í ì	ìX î ì	ìX î ì
	ìX ò ì	ìX ò ñ	ìX ó ì
<	ìX ñ ì	ìX ò ò	ìX ò ì
<í	ìX î ì	ìX î ò	ìX ñ ì
<î	ìX í ñ	ìX î ñ	ìX î ñ
>	ìX î ì	ìX ð ì	ìX ñ ì
>í	ìX ì ò	ìX í ñ	ìX î ì
>î	ìX î ó	ìX ð î	ìX ñ ó
š	ì	ìX ì ó ñ	ìX í ì
L	í ì £	í î £	í ð £