

TM70N04NF

N-Channel Enhancement Mosfet

General Description

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

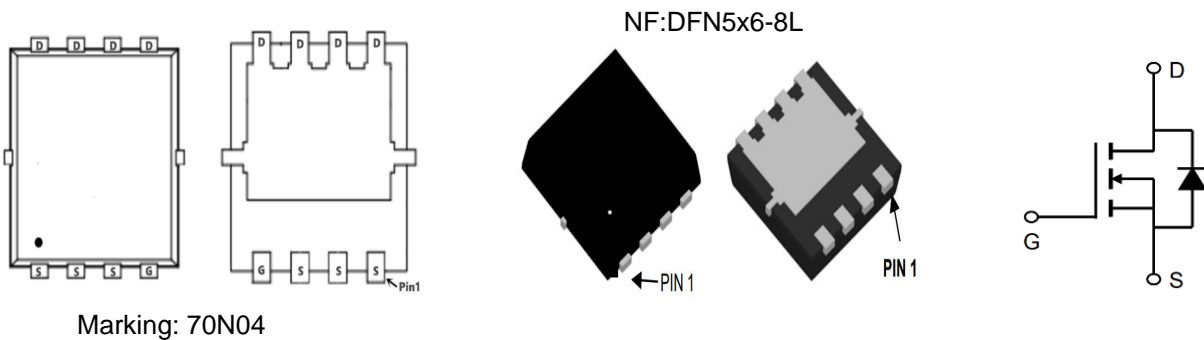
Applications

- Load switch
- PWM

General Features

$V_{DS} = 40V$ $I_D = 70A$
 $R_{DS(ON)} = 9m\Omega (typ.) @ V_{GS} = 10V$

- 100% UIS Tested
- 100% R_g Tested



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

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current- $T_C = 25^\circ C$	70	A
	Continuous Drain Current- $T_C = 100^\circ C$	44	
	Pulsed Drain Current	280	
E_{AS}	Single Pulse Avalanche Energy	76	mJ
P_D	Power Dissipation	72.3	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

Thermal Data

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case ²	1.73	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction to mbient	62	$^\circ C/W$



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Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250 μA	40	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =40V	---	---	1	μA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0A	---	---	±100	nA
On Characteristics³						
V _{GS(th)}	GATE-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μA	1.2	1.6	2.5	V
R _{DS(on)}	Drain-Source On Resistance ²	V _{GS} =10V, I _D =15A	---	9	12	mΩ
		V _{GS} =4.5V, I _D =8A	---	10	14	
G _{FS}	Forward Transconductance	V _{DS} =10V, I _D =10A	---	13	---	S
Dynamic Characteristics⁴						
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1MHz	---	1278	2200	pF
C _{oss}	Output Capacitance		---	135	250	
C _{rss}	Reverse Transfer Capacitance		---	87	170	
Switching Characteristics⁴						
t _{d(on)}	Turn-On Delay Time 3, 4	V _{DD} =15V, I _D =1A, R _G =3.3Ω V _{GS} =10V	---	13.2	25	ns
t _r	Rise Time 3, 4		---	2.2	5	ns
t _{d(off)}	Turn-Off Delay Time 3, 4		---	72	130	ns
t _f	Fall Time 3, 4		---	4.5	10	ns
Q _g	Total Gate Charge 3, 4		---	19.7	30	nC
Q _{gs}	Gate-Source Charge 3, 4 3, 4	V _{GS} =10V, V _{DS} =20V, I _D =10A	---	2.8	4.2	nC
Q _{gd}	Gate-Drain "Miller" Charge 3, 4		---	5.1	7.6	nC
Drain-Source Diode Characteristics						
Symbol	Parameter	Conditions	Min	Typ	Max	Units
V _{SD}	Source-Drain Diode Forward Voltage ³	V _{GS} =0V, I _S =1A	---	---	1	V
I _S	Continuous Source Current	V _G =V _D =0V, Force Current	---	---	70	A
I _{sm}	Pulsed Source Current		---	---	140	A
T _{rr}	Reverse Recovery Time	V _{GS} =0V, I _S =1A, dI/dt=100A/μs T _J =25°C	---	17	---	ns
Q _{rr}	Reverse Recovery Charge		---	2.8	---	nC

Notes:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=39A., R_G=25Ω, Starting T_J=25°C.
3. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
4. Essentially independent of operating temperature.

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Typical Performance Characteristics

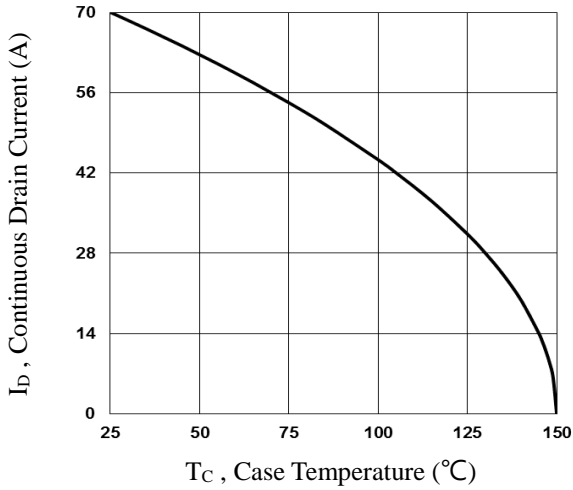


Fig.1 Continuous Drain Current vs. T_c

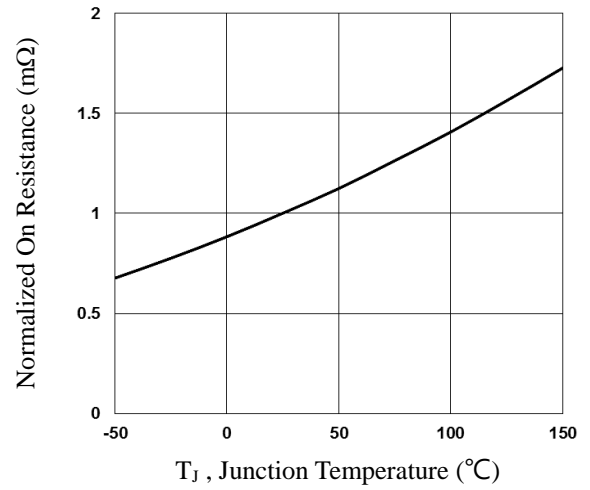


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

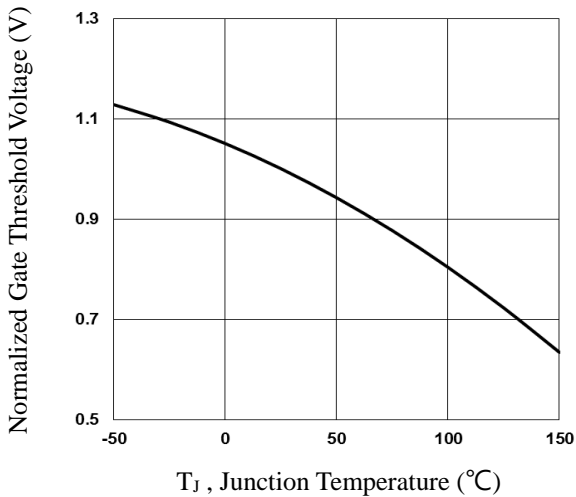


Fig.3 Normalized V_{th} vs. T_j

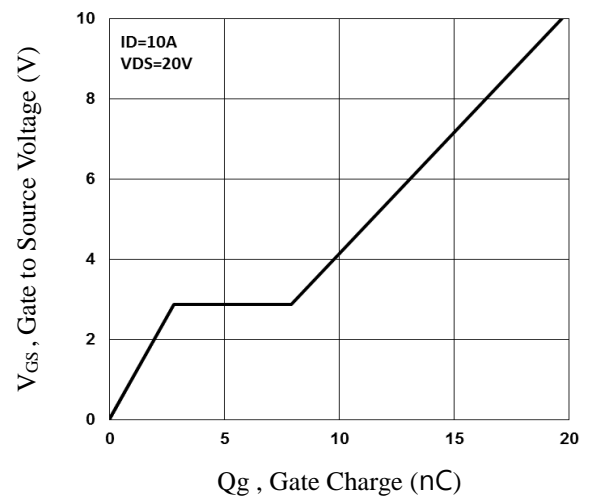


Fig.4 Gate Charge Waveform

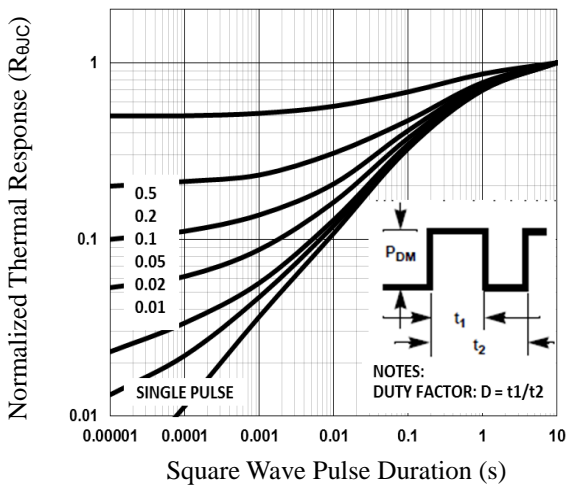


Fig.5 Normalized Transient Impedance

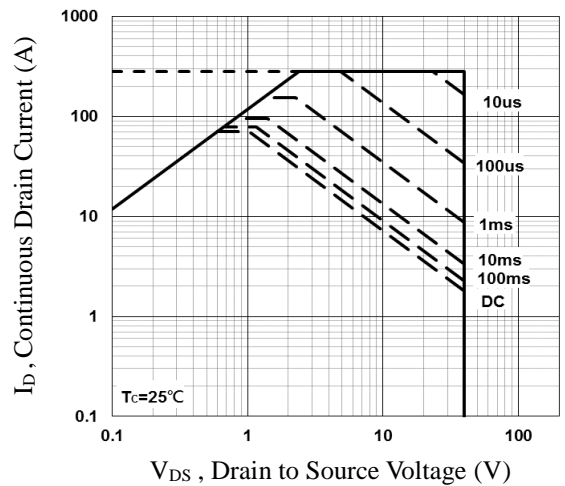


Fig.6 Maximum Safe Operation Area

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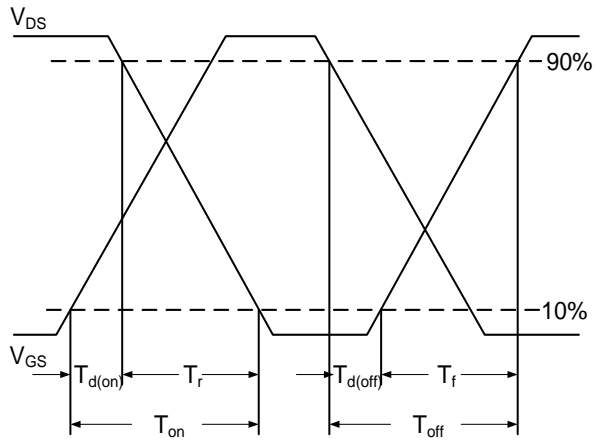


Fig.7 Switching Time Waveform

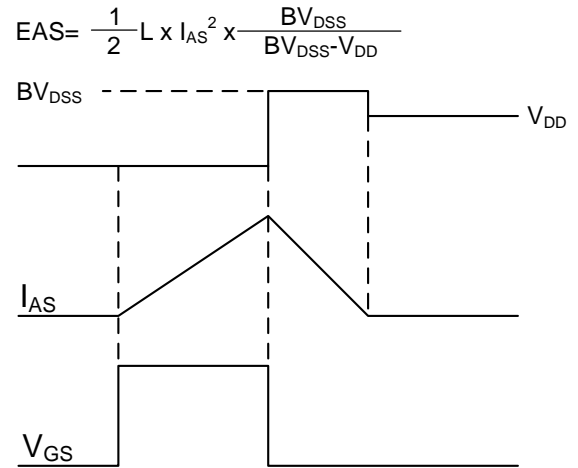
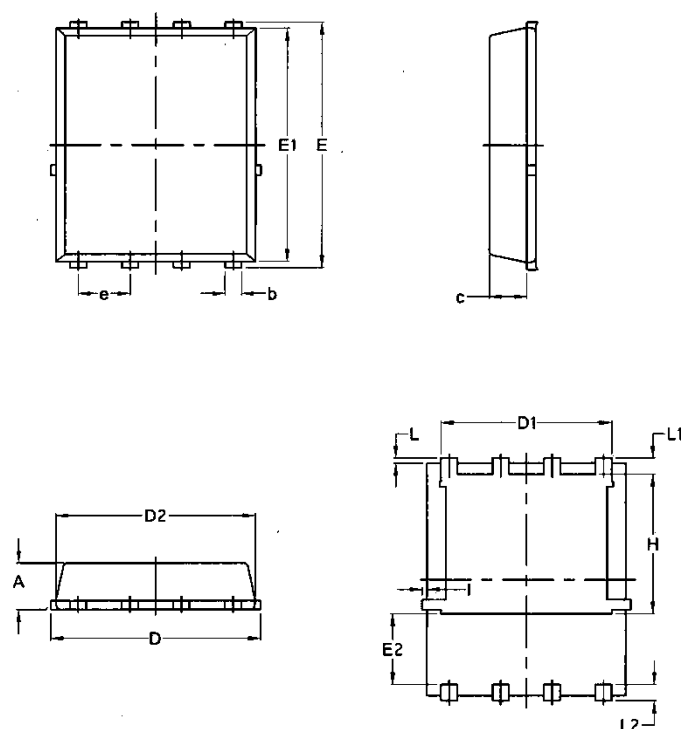


Fig.8 EAS Waveform

Package Mechanical Data:DFN5x6-8L



Symbol	Common			
	mm		Inch	
	Min	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070