



TM40N04DF

N-Channel Enhancement Mosfet

General Description

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

Applications

- Load switch
- PWM

General Features

$V_{DS} = 40\text{ V}$ $I_D = 40\text{ A}$

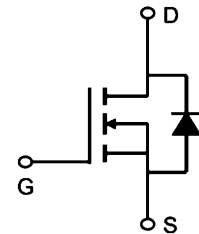
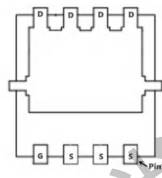
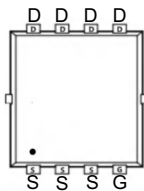
$R_{DS(ON)} = 7.4\text{ m}\Omega$ (typ.) @ $V_{GS} = 10\text{ V}$

100% UIS Tested

100% R_g Tested



DF:PDFN3x3-8L



Marking: 40N04

Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_c = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{ V}$	40	A
$I_D @ T_c = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{ V}$	22.1	A
I_{DM}	Pulsed Drain Current	140	A
$P_D @ T_c = 25^\circ\text{C}$	Total Power Dissipation	44	W
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	---	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	2.8	$^\circ\text{C/W}$



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Electrical Characteristics: ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{GS}=0V, V_{DS}=40V, T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{GS}=0V, V_{DS}=32V, T_J=85^{\circ}\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.6	2.0	V
$R_{DS(on)}$	Drain-Source On Resistance	$V_{GS}=10V, I_D=8A$	---	7.4	10	m Ω
		$V_{GS}=4.5V, I_D=4A$	---	10	13	
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=2A$	---	13	---	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$	---	1205	2180	pF
C_{oss}	Output Capacitance		---	128	245	
C_{rss}	Reverse Transfer Capacitance		---	52	106	
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	2.2	---	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=15V, V_{GS}=10V$ $R_G=3.3\Omega, I_D=1A$	---	13.2	25	ns
t_r	Rise Time		---	2.2	5	ns
$t_{d(off)}$	Turn-Off Delay Time		---	72	130	ns
t_f	Fall Time		---	4.5	10	ns
Q_g	Total Gate Charge	$V_{DS}=20V, V_{GS}=10V, I_D=8A$	---	19.7	30	nC
Q_{gs}	Gate-Source Charge		---	2.8	4.2	nC
Q_{gd}	Gate-Drain "Miller" Charge		---	5.1	7.6	nC



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Drain-Source Diode Characteristics						
I_S	Contiuos Source Curent	$V_G=V_D=0V$, Force Current	---	---	40	A
I_{SM}	Pulsed Source Curent		---	---	70	A
V_{SD}	Source-Drain Diode Forward Voltage	$V_{GS}=0V$, $I_S=1A$, $T_J=25^{\circ}C$	---	---	1	V
t_{rr}	Reverse Recovery Time	$I_S=1A$, $di/dt=100A/\mu s$, $T_J=25^{\circ}C$, $V_{GS}=0V$	---	17	---	nS
Q_{rr}	Reverse Recovery Charge		---	2.8	---	nC



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Typical Characteristics: ($T_c=25^\circ\text{C}$ unless otherwise noted)

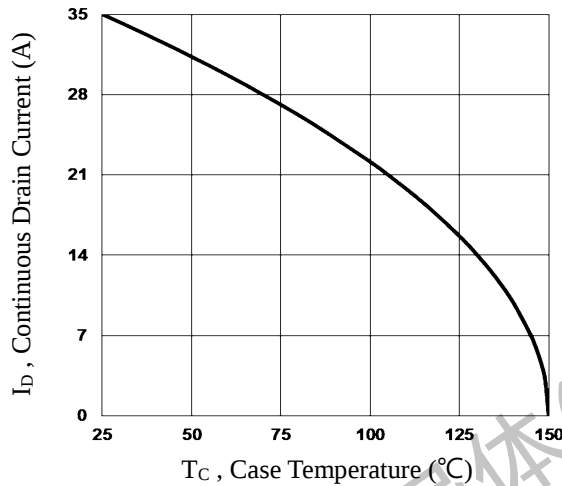


Fig.1 Continuous Drain Current vs. T_C

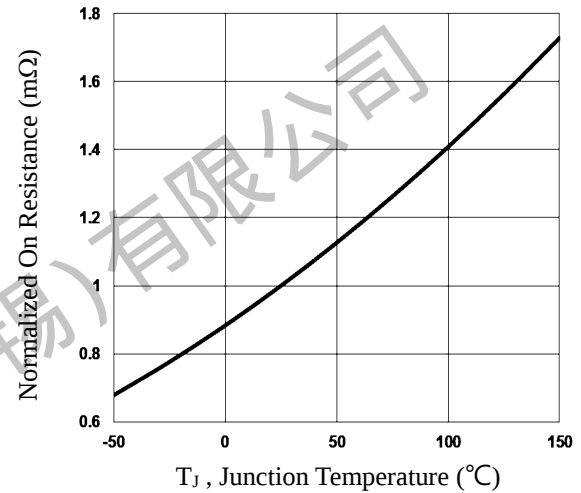


Fig.2 Normalized $R_{DS(on)}$ vs. T_J

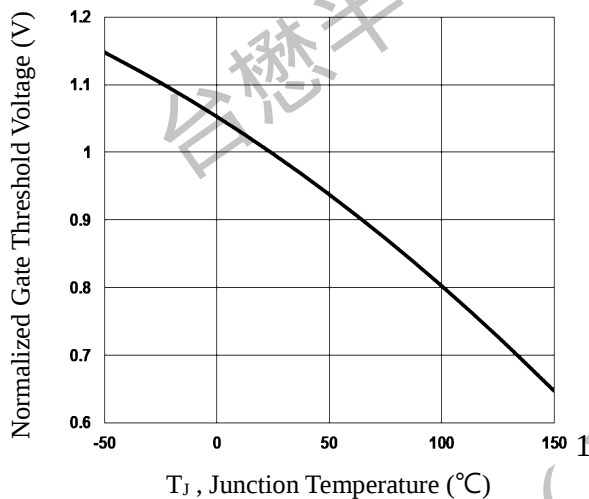


Fig.3 Normalized V_{th} vs. T_J

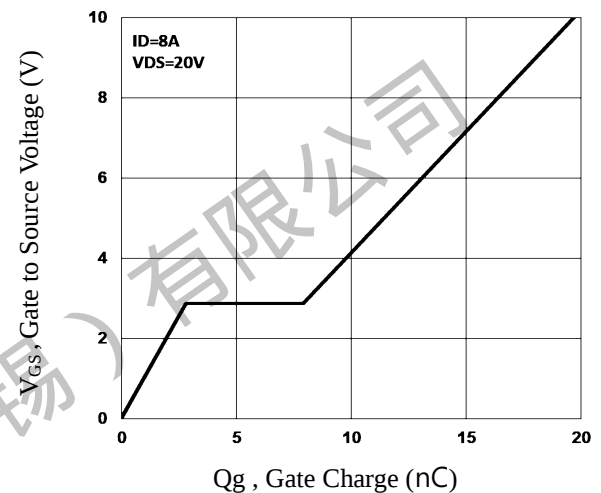


Fig.4 Gate Charge Waveform

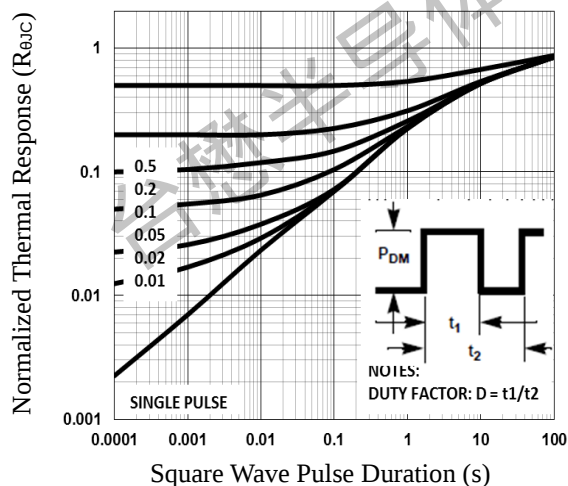


Fig.5 Normalized Transient Impedance

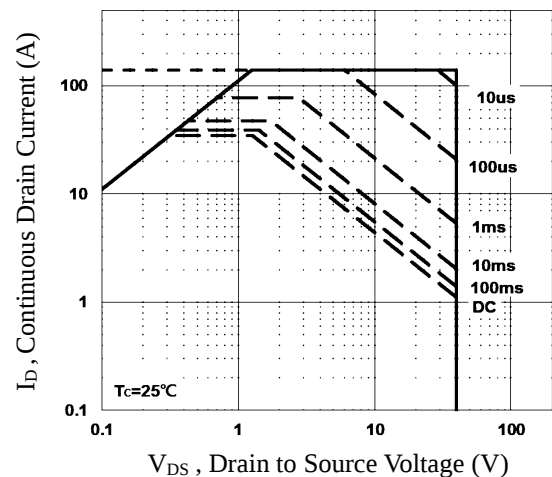
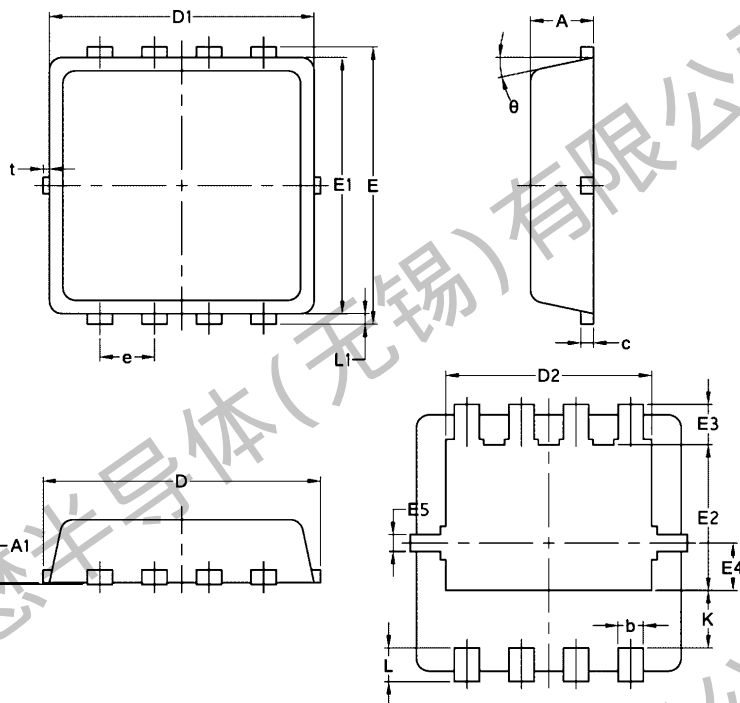


Fig.6 Maximum Safe Operation Area

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Package Mechanical Data:DFN3x3-8L

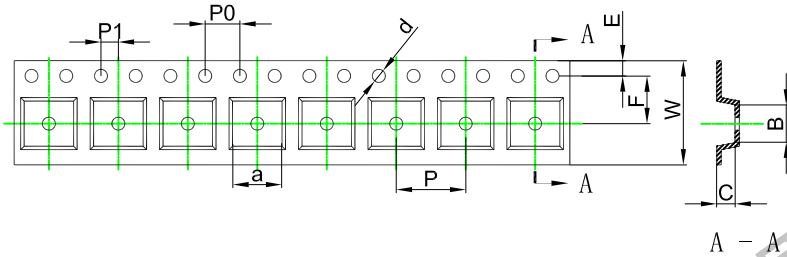


Symbol	Common		
	mm		
	Mim	Nom	Max
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.59	0.69	0.89
L	0.30	0.40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

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PDFN3×3-8L Embossed Carrier Tape



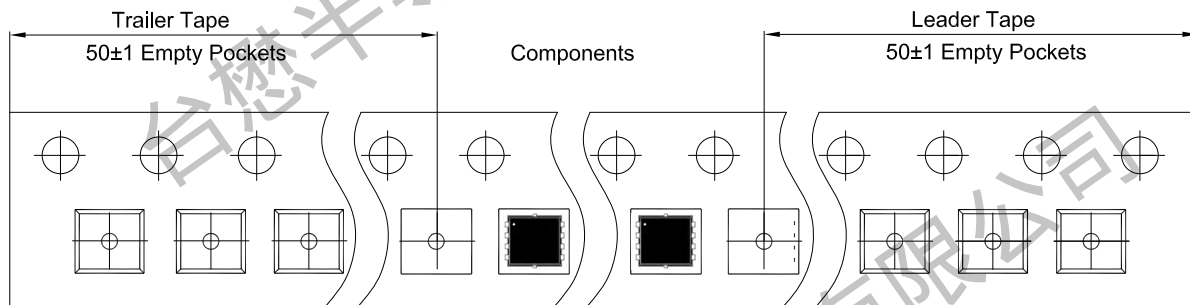
Packaging Description:

SOP-8L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2,500 units per 13" or 33cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

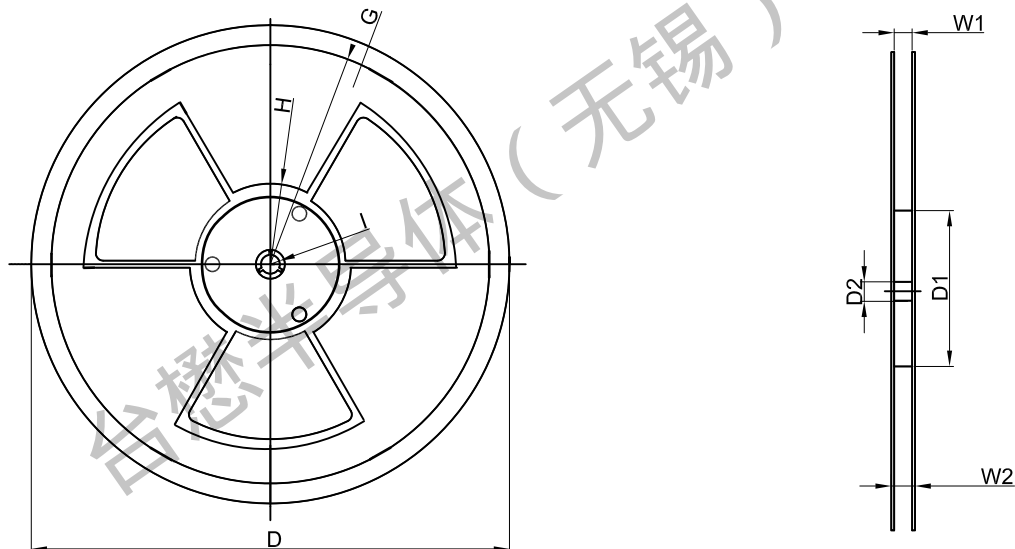
ALL DIM IN mm

Dimensions are in millimeter										
Pkg type	a	B	C	d	E	F	P0	P	P1	W
PDFN3×3-8L	6.40	5.40	2.10	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

PDFN3×3-8L Tape Leader and Trailer



PDFN3×3-8L Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
13"Dia	Ø330.00	100.00	13.00	R135.00	R55.00	R6.50	12.00	14.00

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
5,000 pcs	13 inch	10,000 pcs	370×355×52	50,000 pcs	400×360×368	

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Revision history:

Date	Rev	Description	Page
2023.05.10	23.05	Original	