

TM120N04NF

N-Channel Enhancement Mosfet

General Description

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

Applications

- Load switch
- PWM

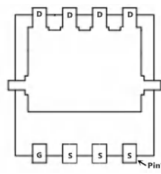
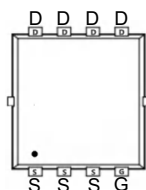
General Features

$V_{DS} = 40V$ $I_D = 120A$

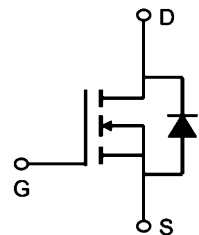
$R_{DS(ON)} = 3.8m\Omega (typ.) @ V_{GS} = 10V$

100% UIS Tested

100% R_g Tested



NF:DFN5x6-8L



Marking: 120N04

Absolute Maximum Ratings ($T_C = 25^\circ C$ 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, $V_{GS} @ 10V$	120	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	78	A
I_{DM}	Pulsed Drain Current	444	A
EAS	Single Pulse Avalanche Energy	150	mJ
P_D	Total Power Dissipation	61	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	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	3.6	$^\circ C/W$



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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-Sourtce Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	40	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _D =40V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _D =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	GATE-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	1.2	1.6	2.0	V
R _{DS(ON)}	Drain-Source On Resistance ³	V _{GS} =10V, I _D =30A	---	3.8	4.4	m Ω
		V _{GS} =4.5V, I _D =20A	---	4.5	5.4	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _D =20V, V _{GS} =0V, f=1MHz	---	5125	---	pF
C _{oss}	Output Capacitance		---	410	---	
C _{rss}	Reverse Transfer Capacitance		---	339	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _D =20V, I _D =30A,	---	11	---	ns
t _r	Rise Time		---	15	---	ns
t _{d(off)}	Turn-Off Delay Time	R _G =3Ω, V _{GS} =10V	---	38	---	ns
t _f	Fall Time		---	14	---	ns
Q _g	Total Gate Charge	V _{GS} =10V, V _D =20V, I _D =30A	---	64	---	nC
Q _{gs}	Gate-Source Charge		---	12.4	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	14	---	nC
Drain-Source Diode Characteristics						
Symbol	Parameter	Conditions	Min	Typ	Max	Units
V _{SD}	Source-Drain Diode Forward Voltage	V _{GS} =0V, I _S =20A	---	---	1.2	V
I _S	Continuous Drain Current	VD=VG=0V	---	---	120	A
I _{SM}	Pulsed Drain Curren	VD=VG=0V	---	---	444	A
Q _{rr}	Reverse Recovery Charge	I _{DS} = 30 A, V _{GS} = 0 V	---	22	---	nC
T _{rr}	Reverse Recovery Time	dI _{SD} /dt = 100 A/μs	---	11	---	ns

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Typical Characteristics

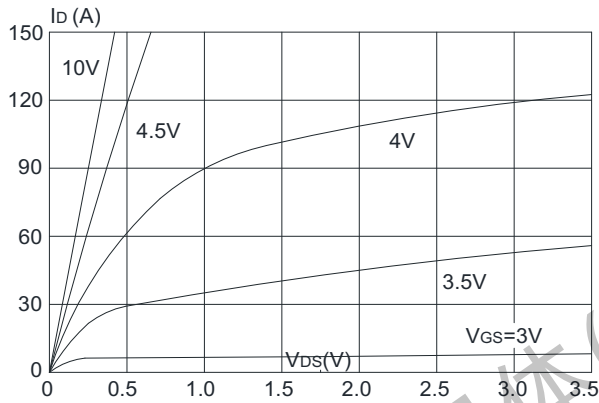


Figure1: Output Characteristics

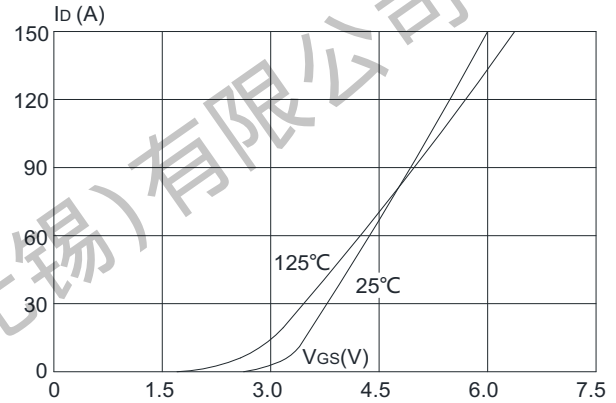


Figure 2: Typical Transfer Characteristics

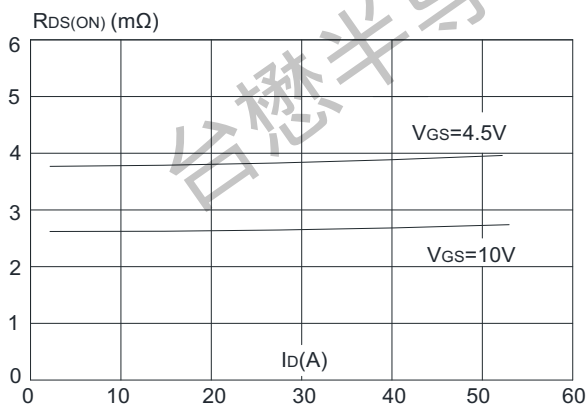


Figure 3: On-resistance vs. Drain Current

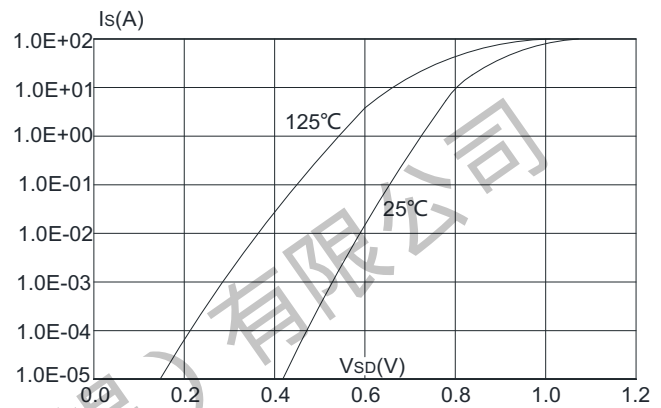


Figure 4: Body Diode Characteristics

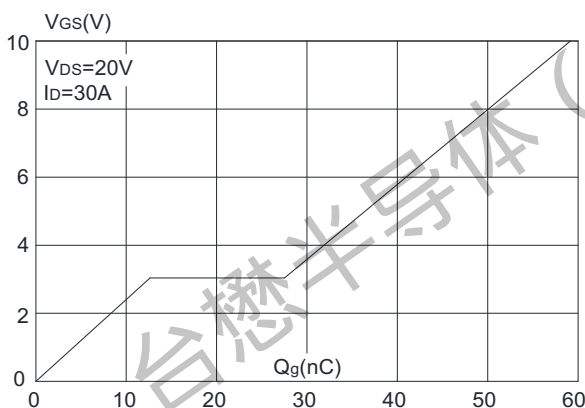


Figure 5: Gate Charge Characteristics

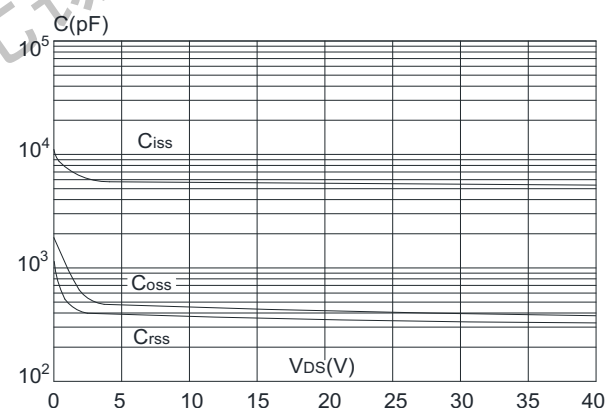


Figure 6: Capacitance Characteristics

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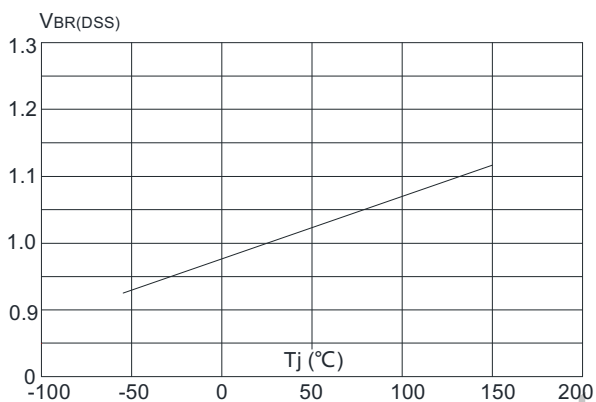


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

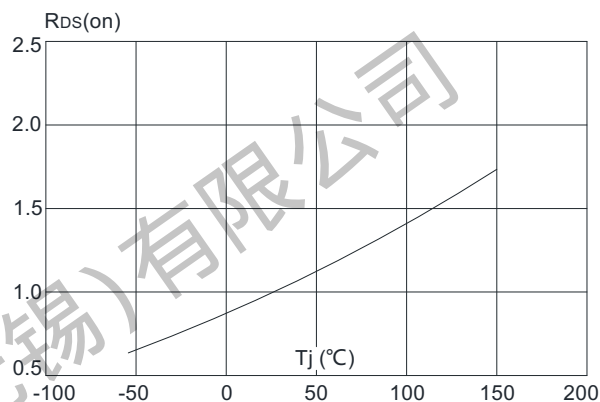


Figure 8: Normalized on Resistance vs. Junction Temperature

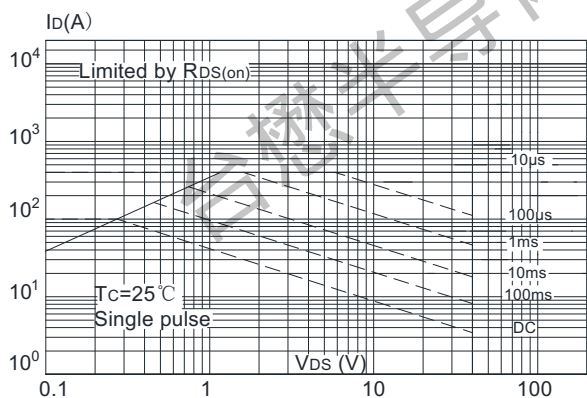


Figure 9: Maximum Safe Operating Area

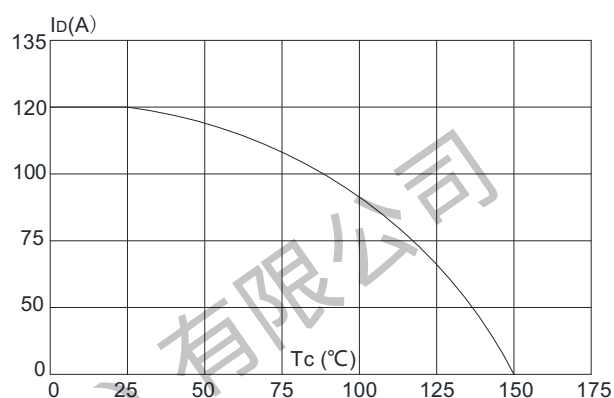


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

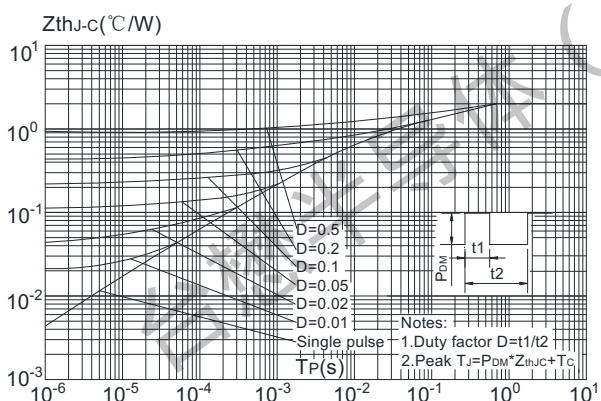
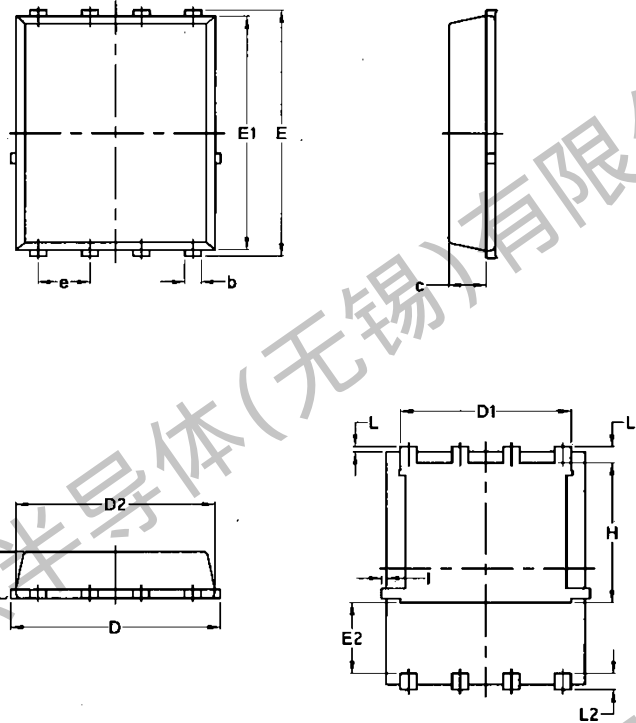


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

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Package Mechanical Data:DFN5x6-8L

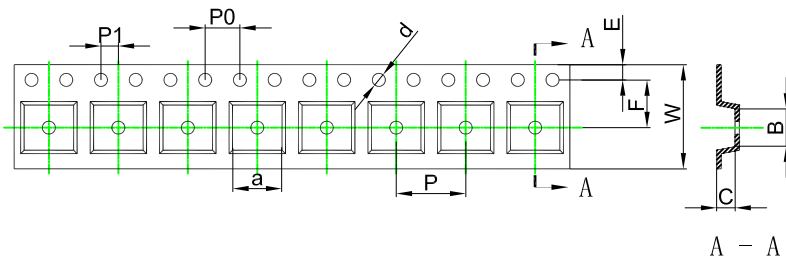


Symbol	Common			
	mm		Inch	
	Mim	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	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

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PDFN5×6-8L Embossed Carrier Tape



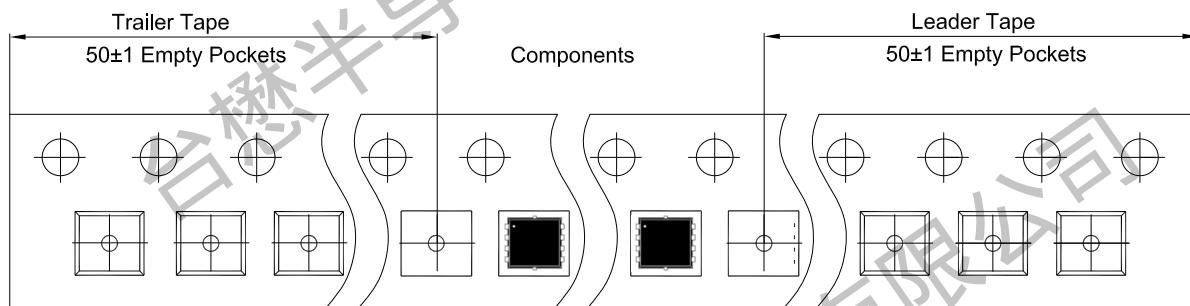
Packaging Description:

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).

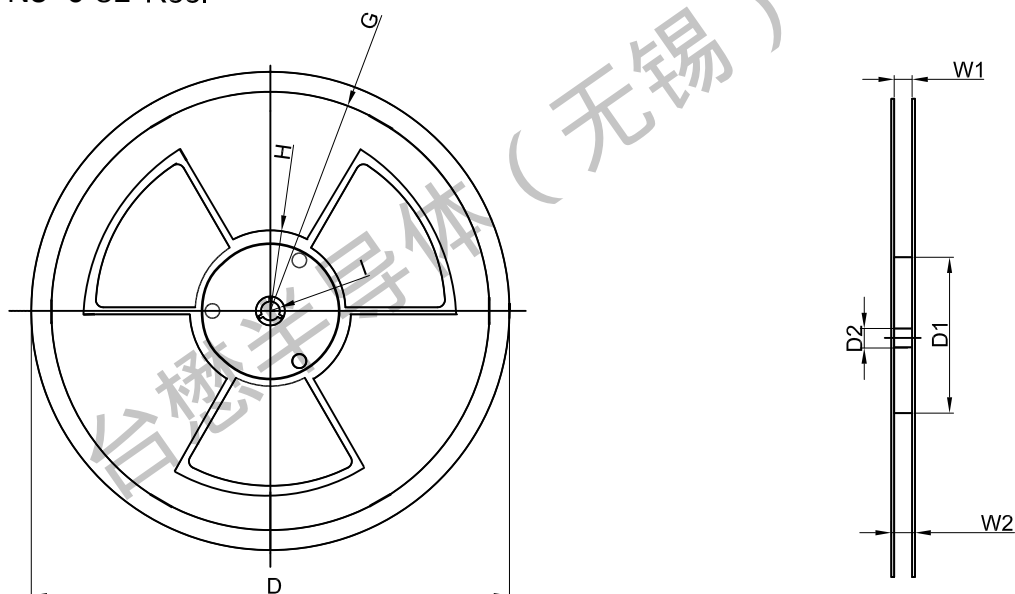
ALL DIM IN mm

Dimensions are in millimeter										
Pkg type	a	B	C	d	E	F	P0	P	P1	W
PDFN5×6-8L	6.40	5.40	2.10	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

PDFN5×6-8L Tape Leader and Trailer



PDFN5×6-8L 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
2023.07.30	23.07	Original	