TM12H04DF

N+N-Channel Enhancement Mosfet

General Description

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

Applications

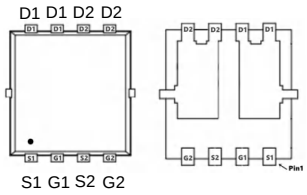
- Load switch
- PWM

General Features

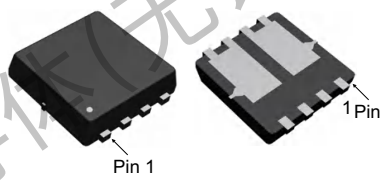
V_{DS} = 40V I_D =12A

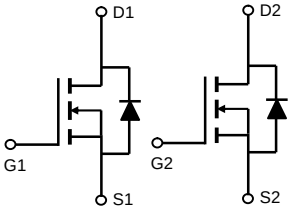
$R_{DS(ON)}$ = 28mΩ(Typ.) @ V_{GS}=10V

100% UIS Tested
100% R_g Tested



DF:DFN3x3-8L





Marking:12H04

Absolute Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V	12	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V	8.4	A
I_{DM}	Pulsed Drain Current	48	A
EAS	Single Pulse Avalanche Energy	5.5	mJ
I_{AS}	Avalanche Current	---	A
P_D@T_C=25℃	Total Power Dissipation	14	W
T_{STG}	Storage Temperature Range	-55 to 175	℃
T_J	Operating Junction Temperature Range	-55 to 175	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	---	---	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	8.9	℃/W

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Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Sourtce Breakdown Voltage	V_{GS}=0V,I_D=250μA	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 Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	V_{GS}=V_{DS}, I_D=250μA	1.2	1.6	2.0	V
$R_{DS(ON)}$	Drain-Source On Resistance	V_{GS}=10V,I_D=10A	---	28	35	mΩ
		V_{GS}=4.5V,I_D=5A	---	36	47	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=20V, V_{GS}=0V, f=1MHz	---	530	---	pF
C_{oss}	Output Capacitance		---	44	--	
C_{rss}	Reverse Transfer Capacitance		---	34	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=20V, I_D=3A, R_G=3Ω ,V_{GS}=10V	---	4.6	---	ns
t_r	Rise Time		---	2	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	47	---	ns
t_f	Fall Time		---	372	---	ns
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=20V, I_D=3A	---	11	---	nC
Q_{gs}	Gate-Source Charge		---	2.2	---	nC
Q_{gd}	Gate-Drain “Miller” Charge		---	2	---	nC
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage	V_{GS}=0V, I_{SD}=30A	---	---	1.2	V
I_S	Continuous Drain Curren	V_D=V_G=0V	---	---	12	A
I_{SM}	Pulsed Drain Current		---	---	48	A
Trr	Reverse Recovery Time	I_F=3A,T_J=25℃ dI/dt=100A/us	---	8.5	---	ns
Qrr	Reverse Recovery Charge		---	3.8	---	nC

Typical Characteristics: (T_c=25℃ unless otherwise noted)

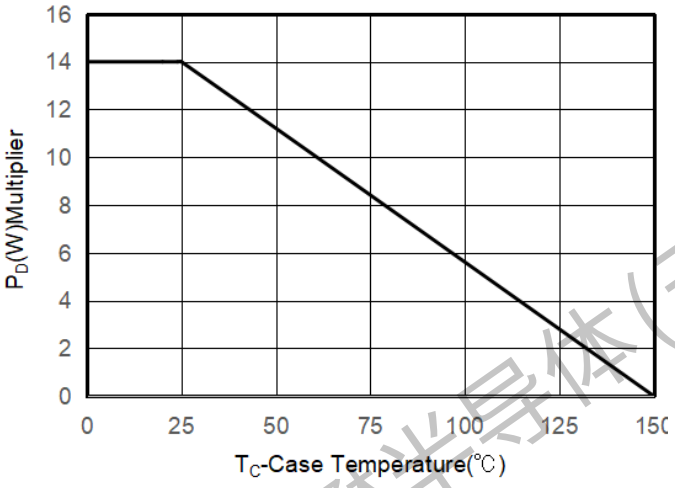

Figure 1: Power De-rating

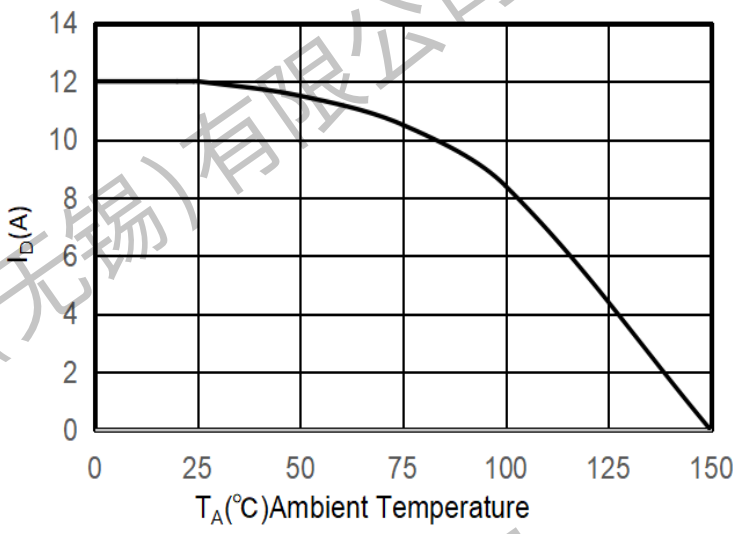

Figure 2: Current De-rating

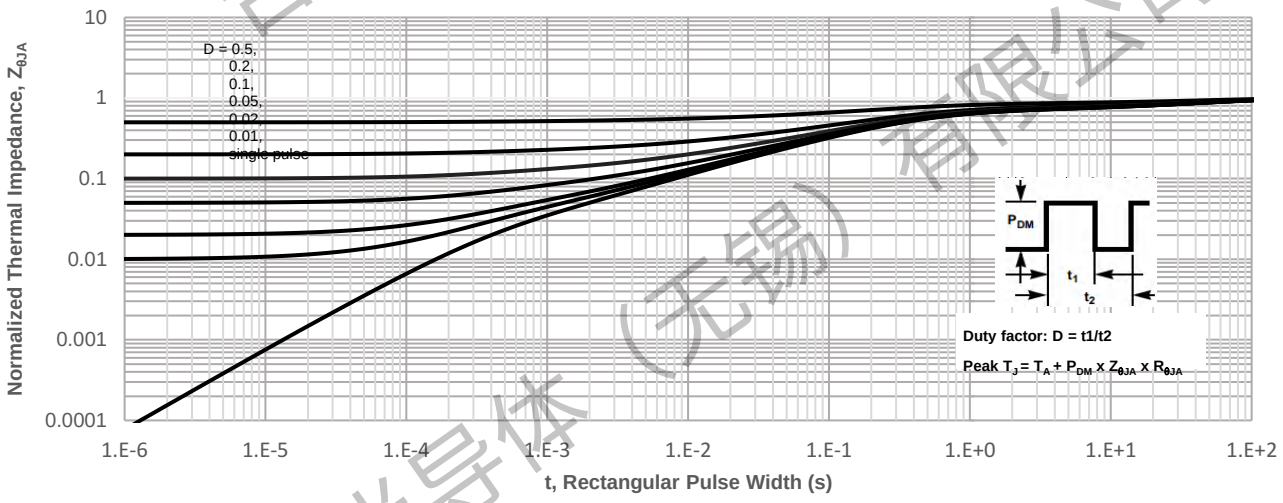

Figure 3: Normalized Maximum Transient Thermal Impedance

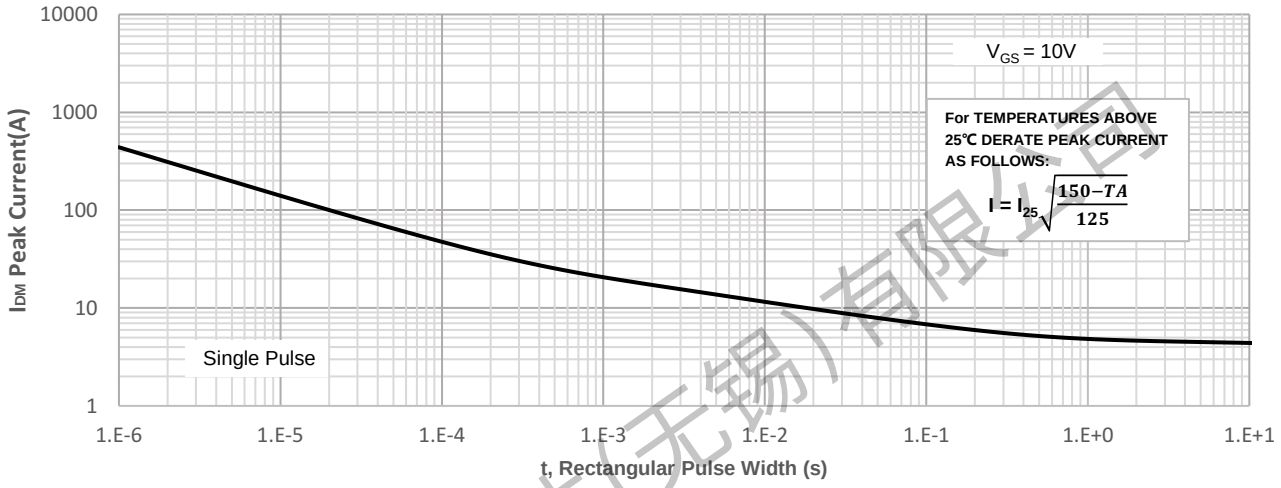

Figure 4: Peak Current Capacity

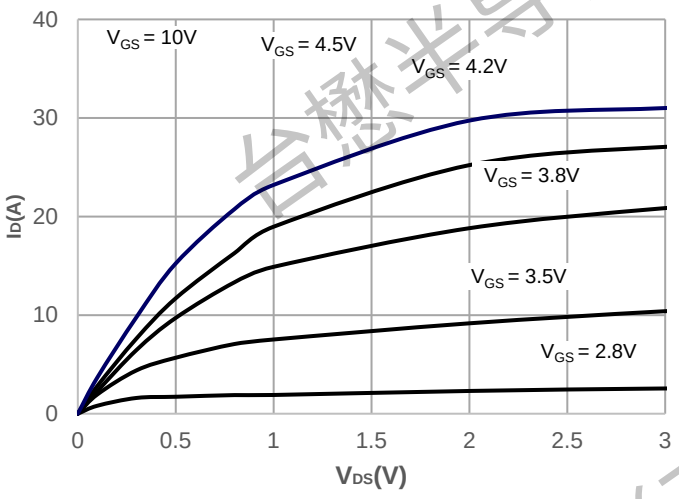

Figure 5: Output Characteristics

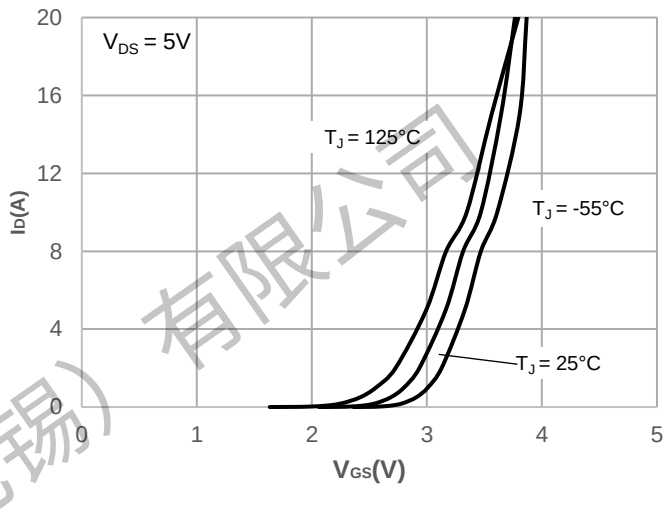

Figure 6: Typical Transfer Characteristics

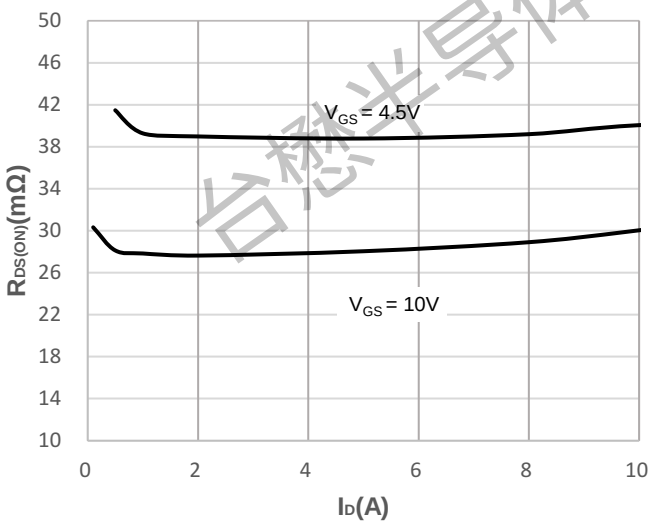

Figure 7: On-resistance vs. Drain Current

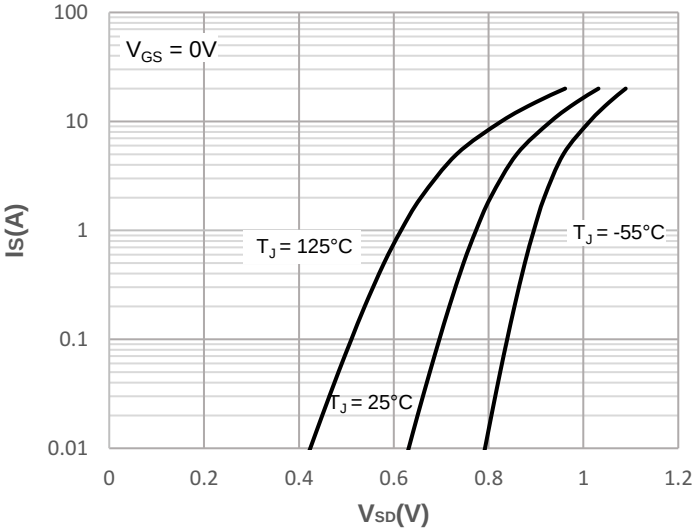

Figure 8: Body Diode Characteristics

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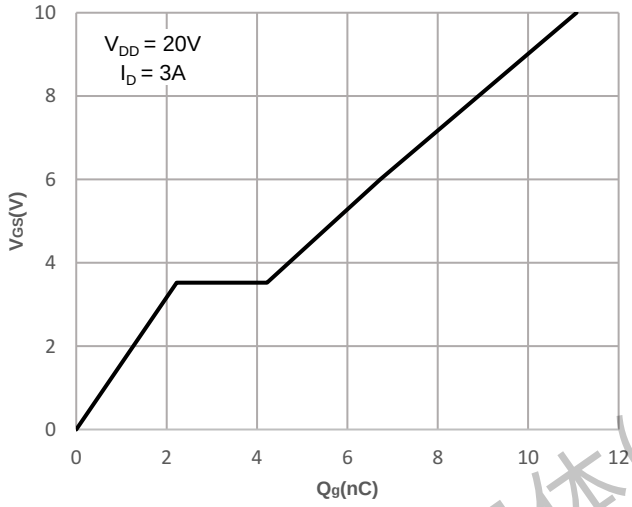


Figure 9: Gate Charge Characteristics

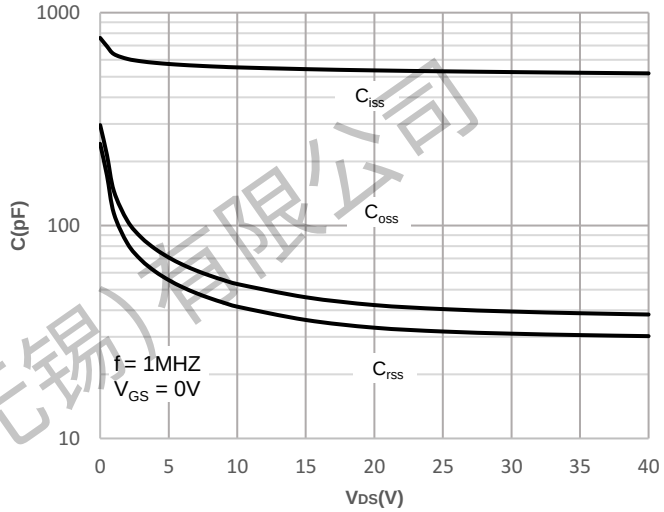


Figure 10: Capacitance Characteristics

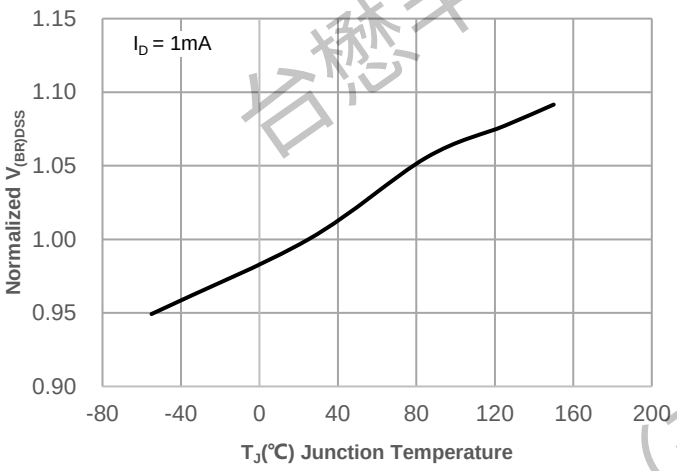


Figure 11: Normalized Breakdown voltage vs. Junction Temperature

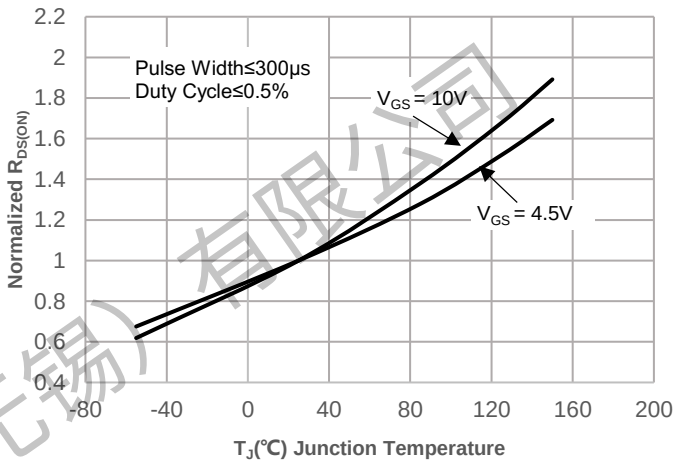


Figure 12: Normalized on Resistance vs. Junction Temperature

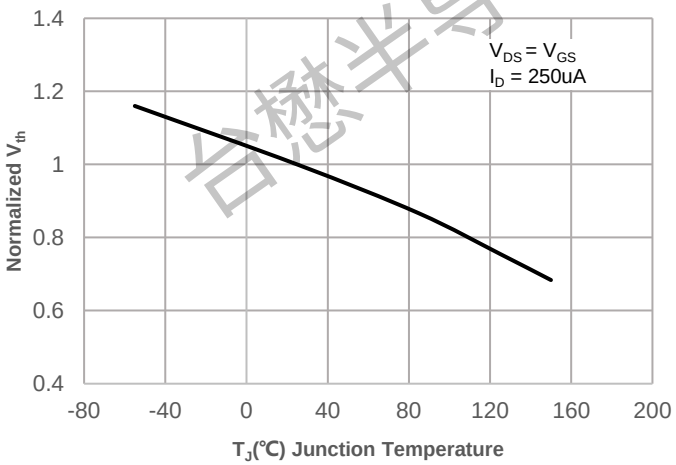


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

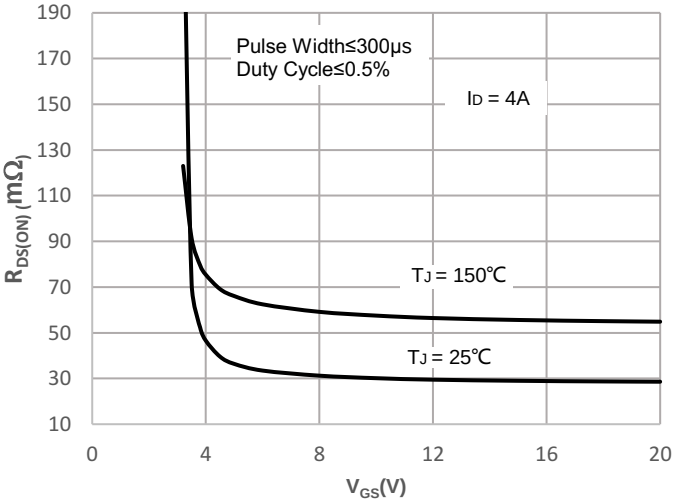


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

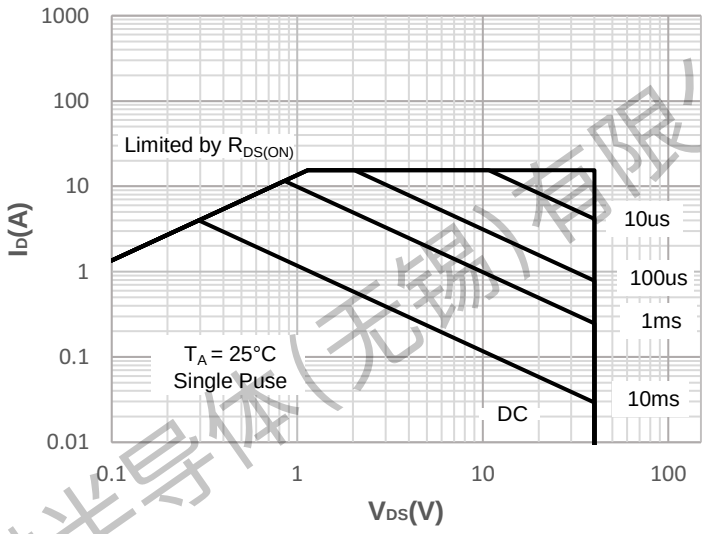
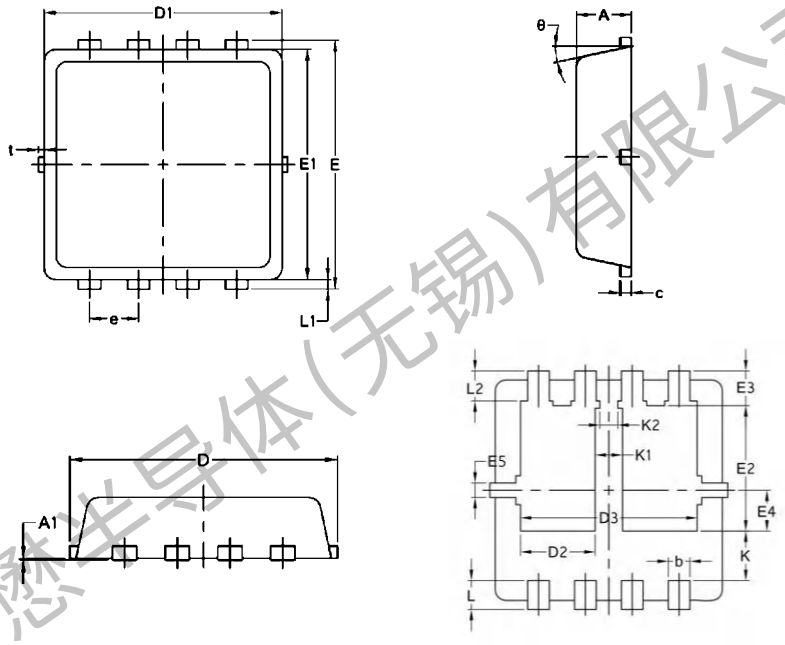


Figure 15: Maximum Safe Operating Area

Package Mechanical Data:DFN3x3-8L



Symbol	Common		
	Mm		
	Min	Nom	Max
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.25	0.30	0.39
c	0.14	0.152	0.20
D	3.20	3.30	3.45
D1	3.05	3.15	3.25
D2	0.84	1.04	1.24
D3	2.30	2.45	2.60
E	3.20	3.30	3.40
E1	2.95	3.05	3.15
E2	1.60	1.74	1.90
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	0.50	0.69	0.80
K1	0.30	0.38	0.53
K2	0.15	0.25	0.35
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
L2	0.27	0.42	0.57
t	0	0.075	0.13
Φ	10°	12°	14°

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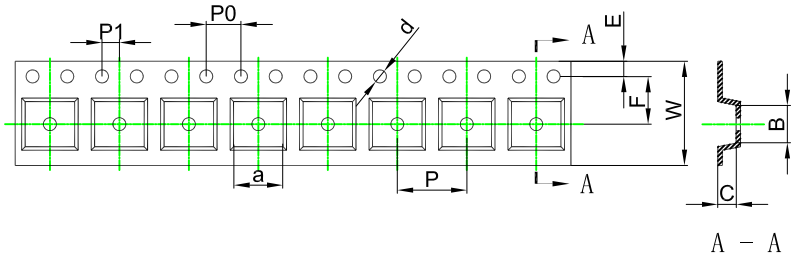
PDFN3×3-8L Embossed Carrier Tape



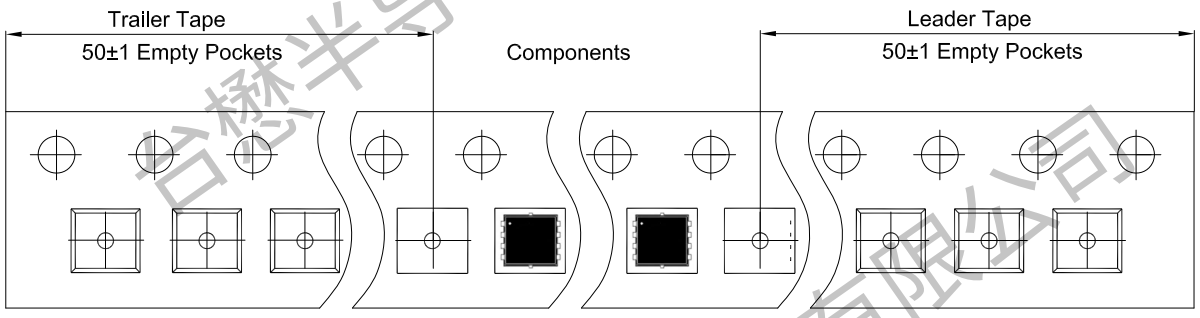
Packaging Description:

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).

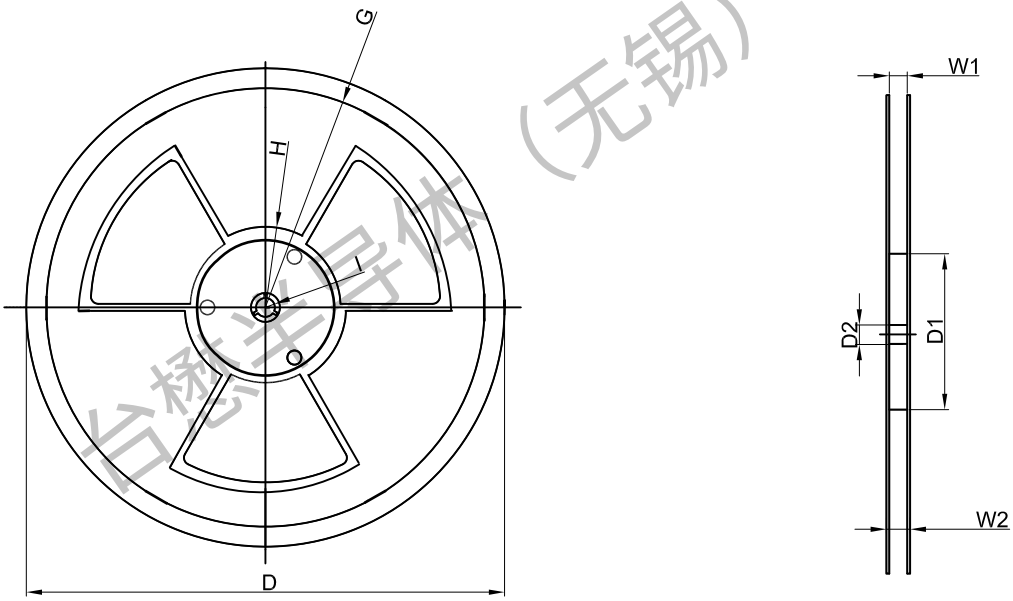
ALL DIM IN mm

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
2023.05.14	23.05	Original	