TM12G10NF

N+P-Channel Enhancement Mode Mosfet

General Description

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

Applications

- Load switch
- PWM

General Features

N Channel

V_{DS} =100V, I_D =15A

$R_{DS(ON)}$=65mΩ(typ.) @V_{GS}=10V

P Channel

V_{DS} = -100V,I_D = -8.0A

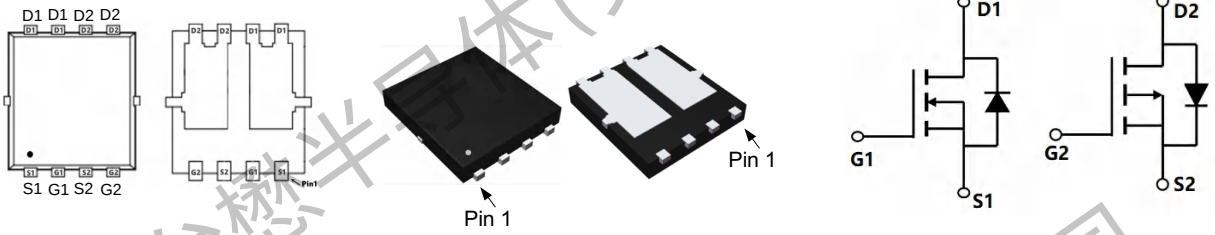
$R_{DS(ON)}$=180mΩ(typ.)@V_{GS}=-10V

100% UIS Tested

100% R_g Tested

Green Product

NF:DFN5x6-8L



Marking: 12G10

Absolute Maximum Ratings (T_A=25°C Unless Otherwise Noted)

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage	100	-100	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ 10V[1]	15	-8	A
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ 10V[1]	9.8	-5.2	A
I_{DM}	Pulsed Drain Current[2]	55	-25.9	A
EAS	Single Pulse Avalanche Energy[3]	22.5	35.3	mJ
I_{AS}	Avalanche Current	22.6	-26.6	A
P_D@T_A=25°C	Total Power Dissipation[4]	3.5	3.5	W
T_{STG}	Storage Temperature Range	-55 to 175	-55 to 175	°C
T_J	Operating Junction Temperature Range	-55 to 175	-55 to 175	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	48	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	5	°C/W

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

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	100	-	-	V
Gate-body Leakage current		I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T_J=25°C	I_{DSS}	V_{DS} =100V, V_{GS} = 0V	-	-	1	μA
	T_J=100°C			-	-	100	
Gate-Threshold Voltage		$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1	2	3	V
Drain-Source on-Resistance[4]		$R_{DS(on)}$	V_{GS} = 10V, I_D = 5A	-	65	90	mΩ
			V_{GS} = 4.5V, I_D = 3A	-	75	105	
Forward Transconductance[4]		g_{fs}	V_{DS}=5V , I_D=5A	-	12	-	S
Dynamic Characteristics[5]							
Input Capacitance		C_{iss}	V_{DS} = 15V, V_{GS} =0V, f =1MHz	-	1220	-	pF
Output Capacitance		C_{oss}		-	53	-	
Reverse Transfer Capacitance		C_{rss}		-	42	-	
Gate Resistance		R_g	f =1MHz	-	1.3	-	Ω
Switching Characteristics[5]							
Total Gate Charge		Q_g	V_{GS} = 10V, V_{DS} = 50V, I_D=5A	-	20.6	-	nC
Gate-Source Charge		Q_{gs}		-	4	-	
Gate-Drain Charge		Q_{gd}		-	3.7	-	
Turn-On Delay Time		$t_{d(on)}$	V_{GS} =10V, V_{DD} =50V, R_G = 3Ω, I_D= 5A	-	4.7	-	ns
Rise Time		t_r		-	21	-	
Turn-Off Delay Time		$t_{d(off)}$		-	20	-	
Fall Time		t_f		-	16	-	
Drain-Source Body Diode Characteristics							
Diode Forward Voltage[4]		V_{SD}	I_S = 1A, V_{GS} = 0V	-	-	1.2	V
Continuous Source Current	T_C=25°C	I_S	-	-	-	15	A

Notes:
1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
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}=8A
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.

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N-Channel Typical Characteristics

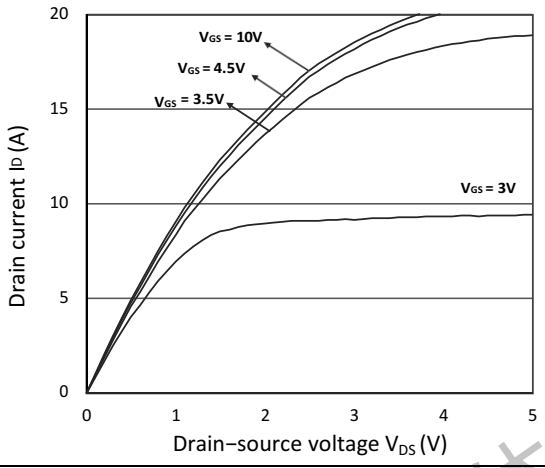

Figure 1. Output Characteristics

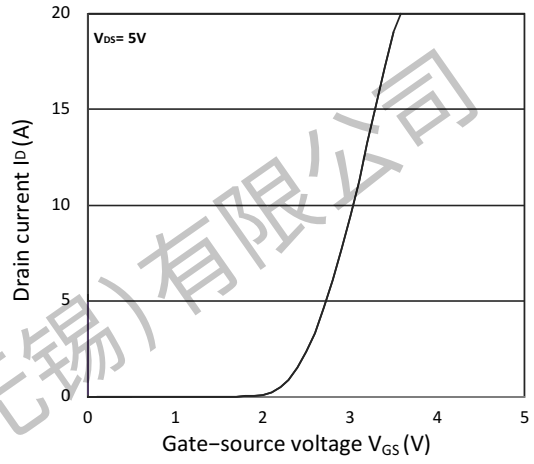

Figure 2. Transfer Characteristics

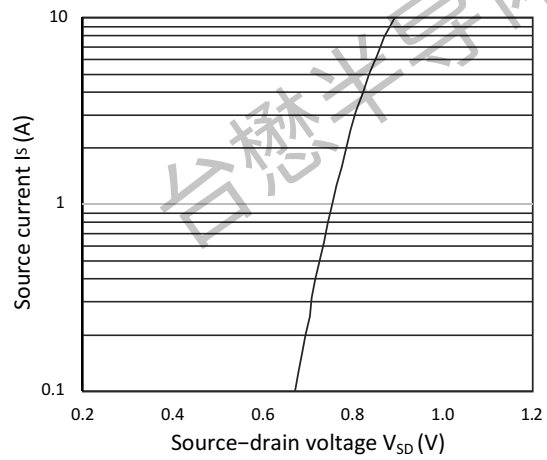

Figure 3. Forward Characteristics of Reverse

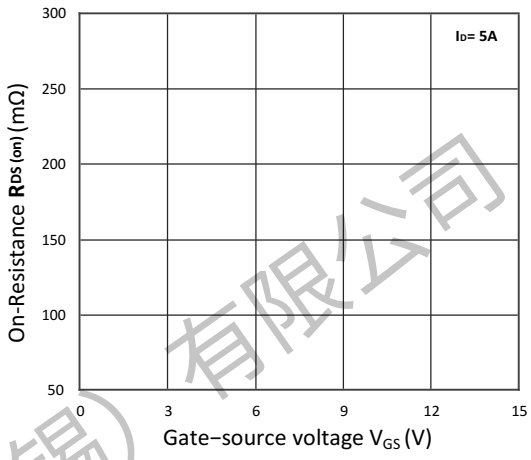

Figure 4. $R_{DS(ON)}$ vs. V_{GS}

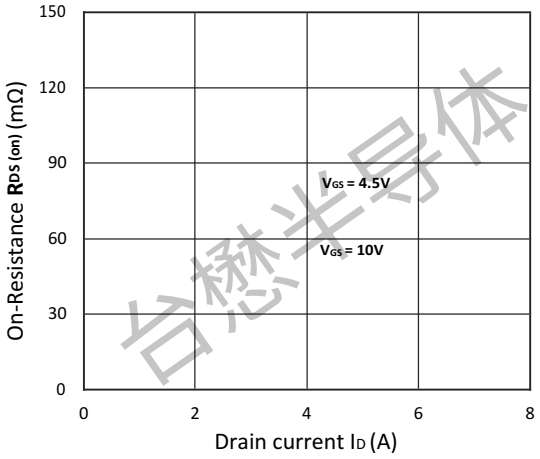

Figure 5. $R_{DS(ON)}$ vs. I_D

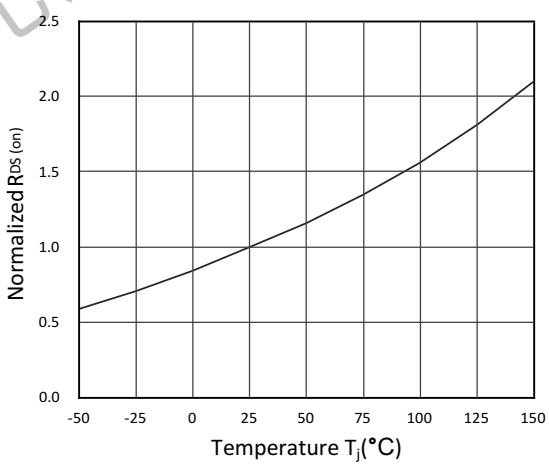

Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

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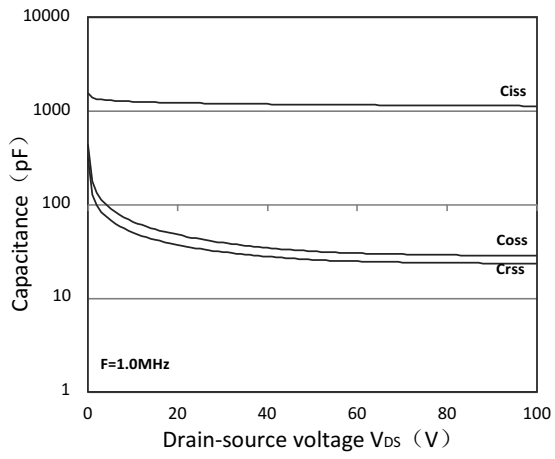

Figure 7. Capacitance Characteristics

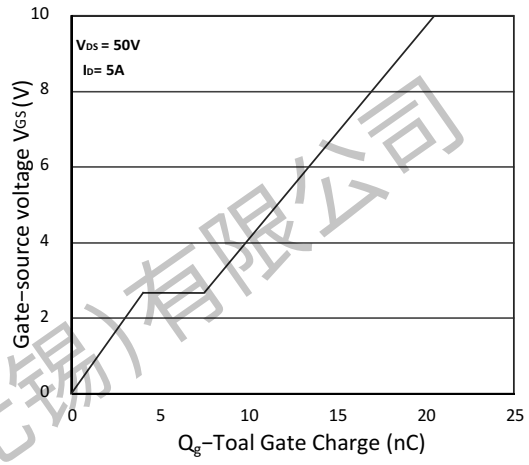

Figure 8. Gate Charge Characteristics

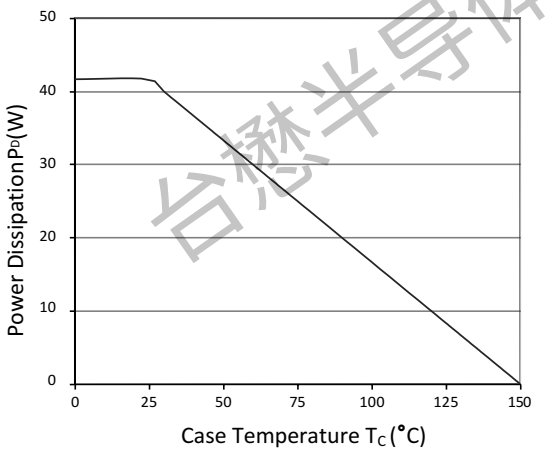

Figure 9. Power Dissipation

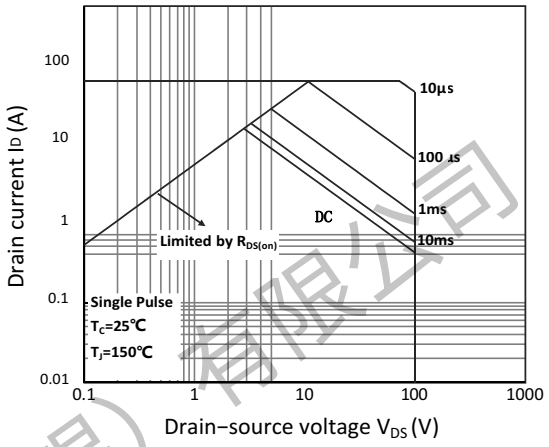

Figure10. Safe Operating Area

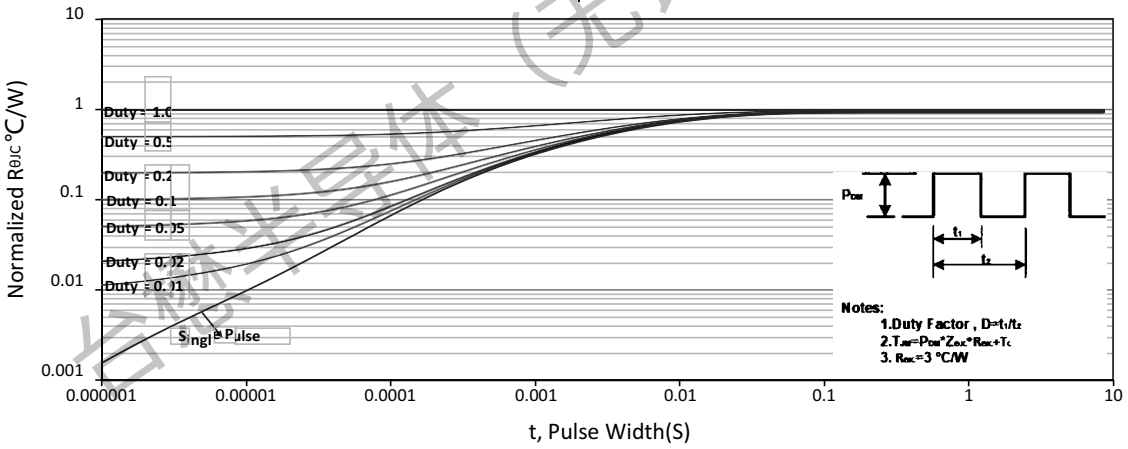

Figure 11. Normalized Maximum Transient Thermal Impedance

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-100	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-3A	---	180	220	mΩ
		V_{GS}=-4.5V , I_D=-2A	---	210	255	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1	-2	-3	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-80V , V_{GS}=0V , T_J=25°C	---	---	-1	uA
		V_{DS}=-80V , V_{GS}=0V , T_J=85°C	---	---	-30	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	13	---	Ω
Q_g	Total Gate Charge (-10V)	V_{DS}=-50V , V_{GS}=-10V , I_D=-2A	---	19	---	nC
Q_{gs}	Gate-Source Charge		---	3.4	---	
Q_{gd}	Gate-Drain Charge		---	2.9	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-30V , V_{GS}=-10V , R_G=3.3Ω, I_D=-1A	---	9	---	ns
T_r	Rise Time		---	6	---	
$T_{d(off)}$	Turn-Off Delay Time		---	39	---	
T_f	Fall Time		---	33	---	
C_{iss}	Input Capacitance	V_{DS}=-30V , V_{GS}=0V , f=1MHz	---	1228	---	pF
C_{oss}	Output Capacitance		---	41	---	
C_{rss}	Reverse Transfer Capacitance		---	29	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	-8.0	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25°C	---	---	-1.2	V

Note :
1.The data tested by surface mounted on a 1 inch^2 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=0.5mH,I_{AS}=-14A
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.

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P-Channel Typical Characteristics

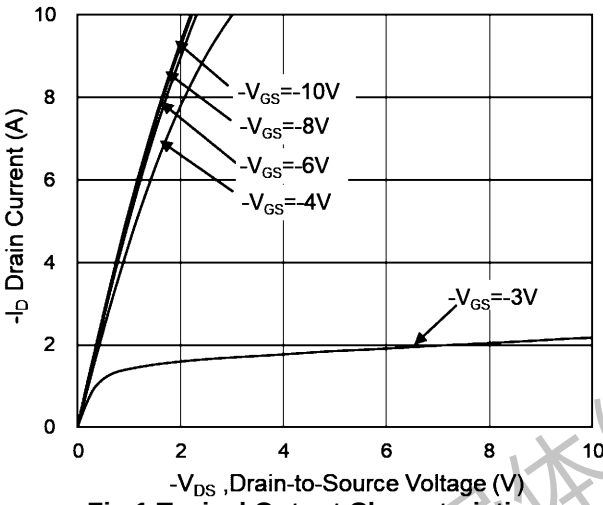

Fig.1 Typical Output Characteristics

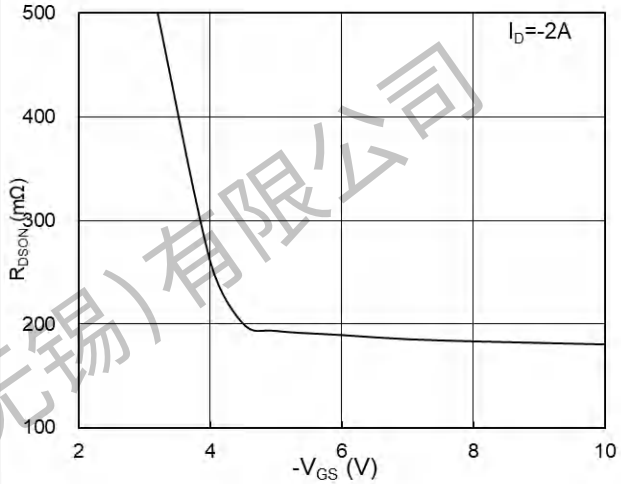

Fig.2 On-Resistance vs G-S Voltage

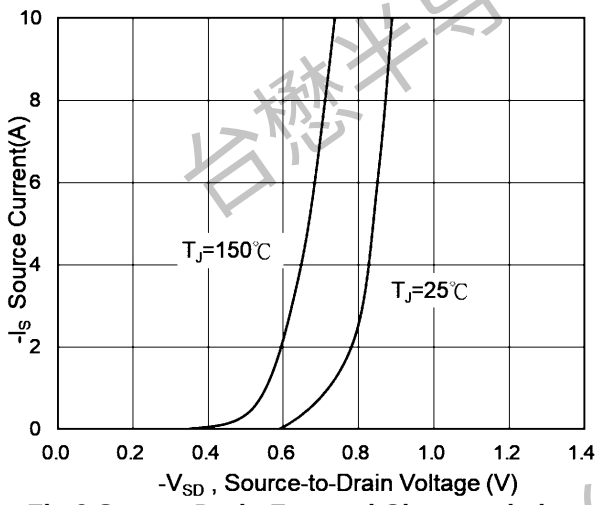

Fig.3 Source Drain Forward Characteristics

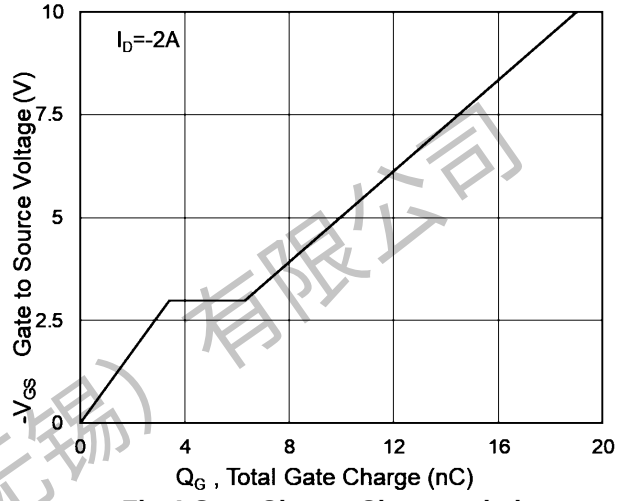

Fig.4 Gate-Charge Characteristics

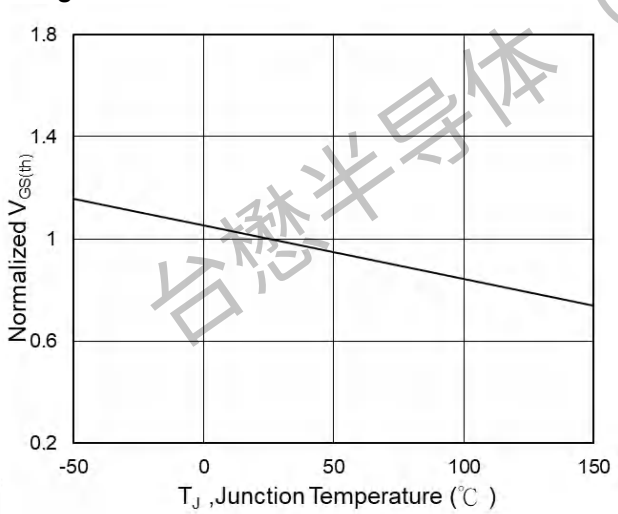

Fig.5 Normalized $V_{GS(th)}$ vs T_J

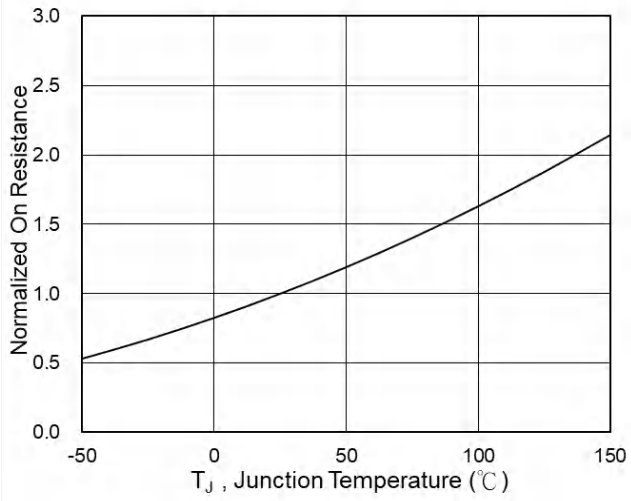

Fig.6 Normalized R_{DSON} vs T_J

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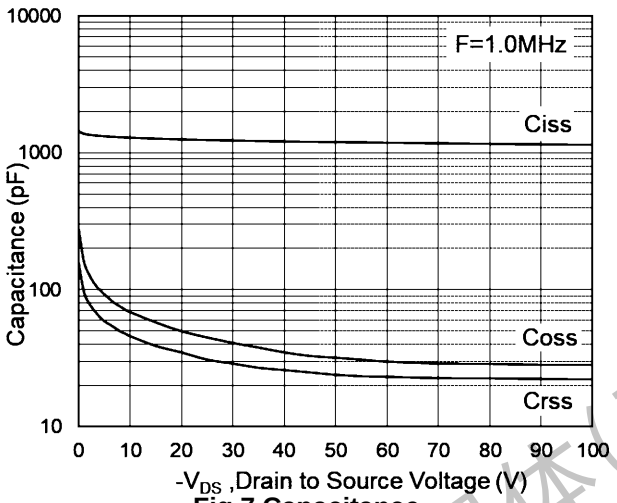


Fig.7 Capacitance

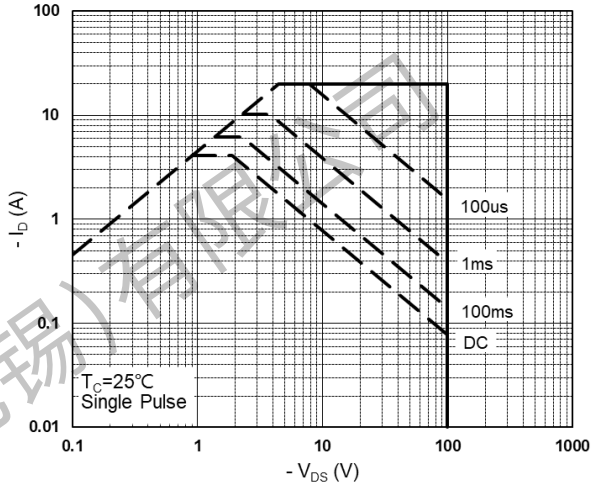


Fig.8 Safe Operating Area

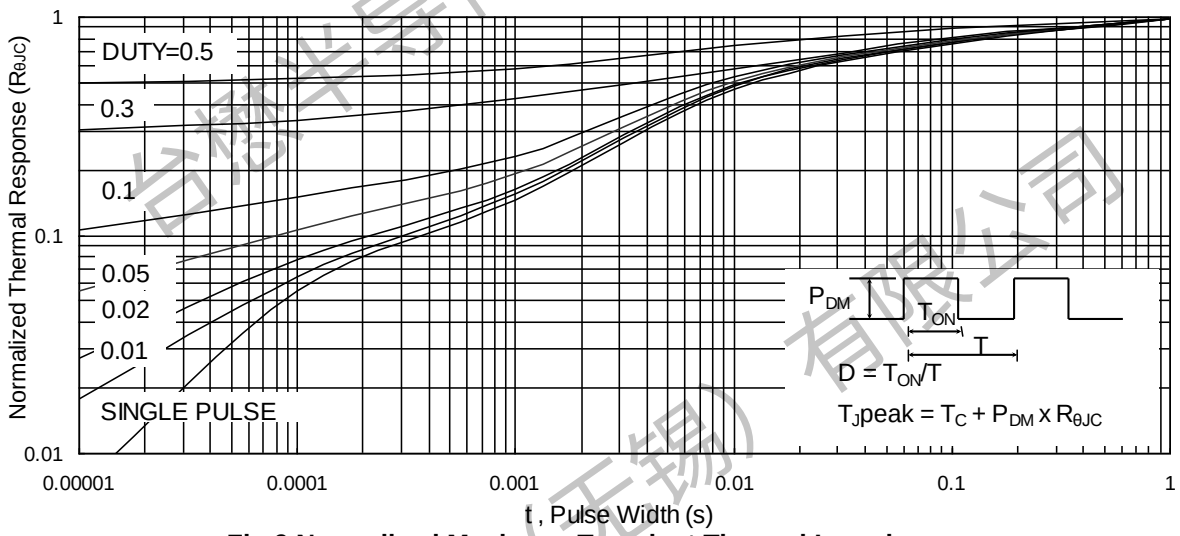


Fig.9 Normalized Maximum Transient Thermal Impedance

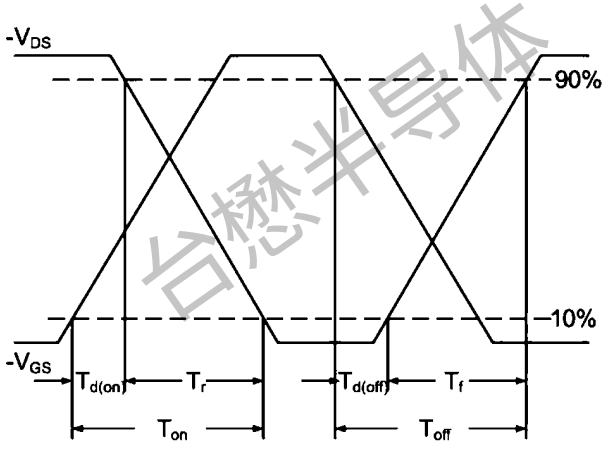


Fig.10 Switching Time Waveform

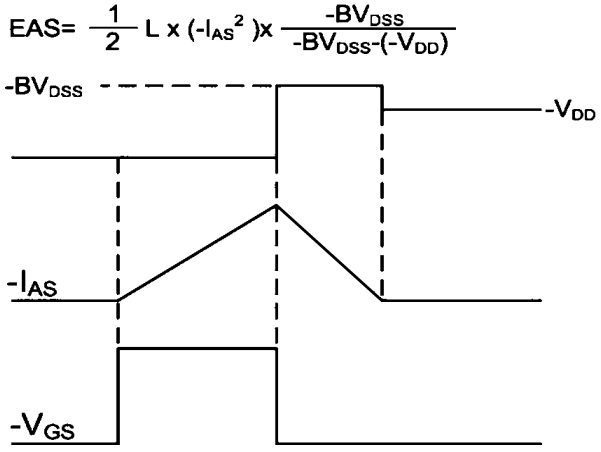
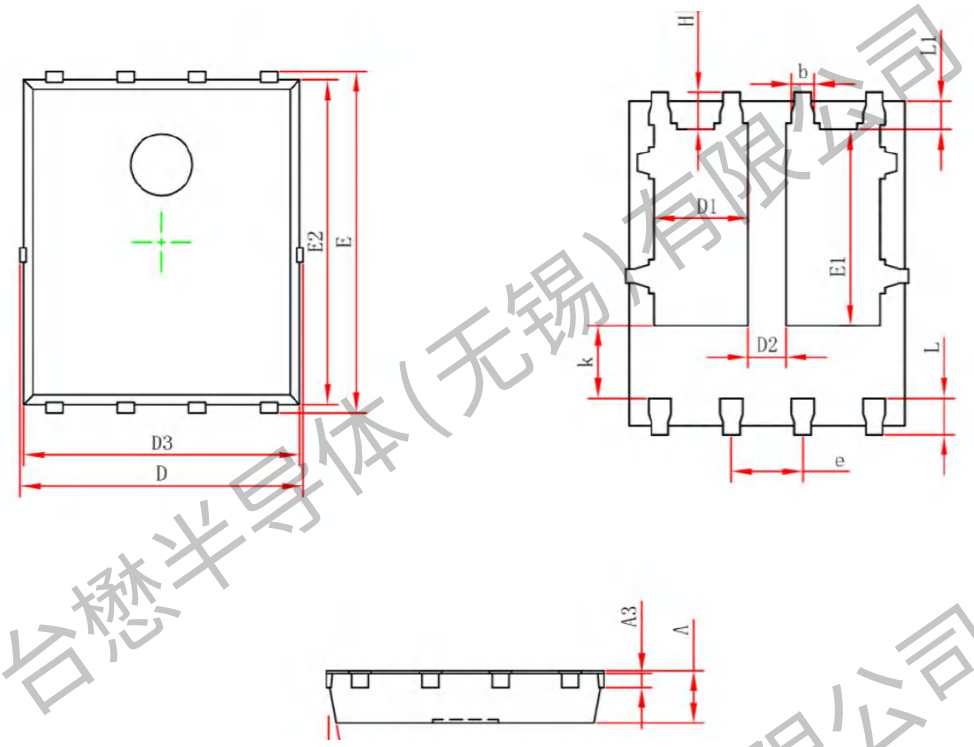


Fig.11 Unclamped Inductive Waveform

Package Mechanical Data:DFN5x6-8L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.154REF.		0.006REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

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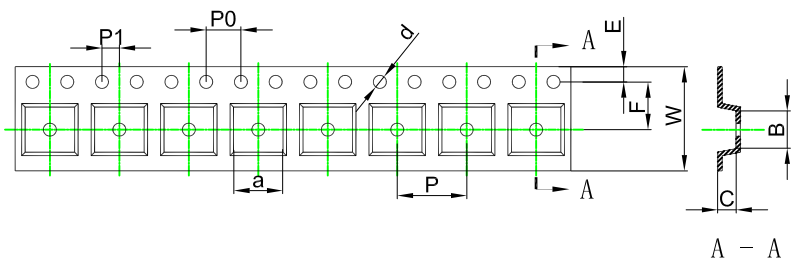
PDFN5×6-8L Embossed Carrier Tape



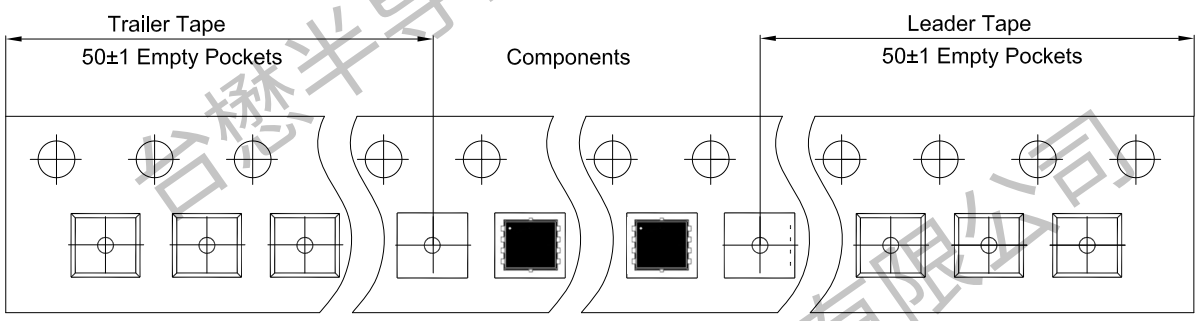
Packaging Description:

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).

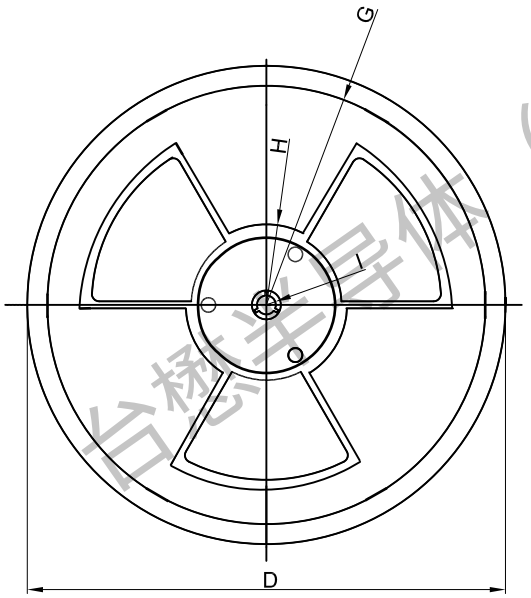
ALL DIM IN mm

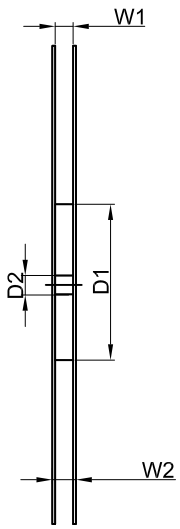
Dimensions are in millimeter										
Pkg type	a	B	C	d	E	F	P0	P	P1	W
PDFN5×6-8L	6.40	5.40	2.10	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

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	

Important Notices and Disclaimers

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- Before final design, purchase, or use, customers should obtain and confirm the latest product information and specifications.
- Tritech-MOS Technology Corp. makes no warranties, representations or warranties regarding the suitability of its products for any specific purpose, and Tritech-MOS Technology Corp. does not assume any responsibility for application assistance or customer product design.
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Revision history:

Date	Rev	Description	Page
2023.08.28	23.08	Original	