

TM10G03DF

N+P-Channel Enhancement Mosfet

General Description • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant Applications • Load switch • PWM	General Features N Channel $V_{DS} = 30\text{ V}, I_D = 9.5\text{ A}$ $R_{DS(ON)} = 18\text{ m}\Omega(\text{typ.}) @ V_{GS} = 10\text{ V}$ P Channel $V_{DS} = -30\text{ V}, I_D = -8.5\text{ A}$ $R_{DS(ON)} = 40\text{ m}\Omega(\text{typ.}) @ V_{GS} = -10\text{ V}$ 100% UIS Tested 100% R_g Tested																																																														
D1 D2 D2 D1 S1 G1 S2 G2 D1 D2 D1 D2 S1 G1 S2 G2 DF:DFN3x3-8L Pin 1 1 Pin D1 G1 S1 D2 G2 S2 Marking: 10G03																																																															
Absolute Maximum Ratings($T_A = 25^\circ\text{C}$ Unless Otherwise Noted) <table><tr><th rowspan="2">Symbol</th><th rowspan="2">Parameter</th><th colspan="2">Rating</th><th rowspan="2">Units</th></tr><tr><th>N-Channel</th><th>P-Channel</th></tr><tr><td>V_{DS}</td><td>Drain-Source Voltage</td><td>30</td><td>-30</td><td>V</td></tr><tr><td>V_{GS}</td><td>Gate-Source Voltage</td><td>± 20</td><td>± 20</td><td>V</td></tr><tr><td>$I_D @ T_A = 25^\circ\text{C}$</td><td>Continuous Drain Current, $V_{GS} @ 10\text{ V}$</td><td>9.5</td><td>-8.5</td><td>A</td></tr><tr><td>$I_D @ T_A = 100^\circ\text{C}$</td><td>Continuous Drain Current, $V_{GS} @ 10\text{ V}$</td><td>6.5</td><td>-6</td><td>A</td></tr><tr><td>I_{DM}</td><td>Pulsed Drain Current</td><td>42</td><td>-40</td><td>A</td></tr><tr><td>EAS</td><td>Single Pulse Avalanche Energy</td><td>17</td><td>15</td><td>mJ</td></tr><tr><td>$P_D @ T_C = 25^\circ\text{C}$</td><td>Total Power Dissipation</td><td>3</td><td>2.8</td><td>W</td></tr><tr><td>T_{STG}</td><td>Storage Temperature Range</td><td>-55 to 175</td><td>55 to 175</td><td>$^\circ\text{C}$</td></tr><tr><td>T_J</td><td>Operating Junction Temperature Range</td><td>-55 to 175</td><td>55 to 175</td><td>$^\circ\text{C}$</td></tr></table> Thermal Data <table><tr><th>Symbol</th><th>Parameter</th><th>Typ.</th><th>Max.</th><th>Unit</th></tr><tr><td>$R_{\theta JA}$</td><td>Thermal Resistance Junction-Ambient</td><td>41.7</td><td>44.6</td><td>$^\circ\text{C/W}$</td></tr></table>		Symbol	Parameter	Rating		Units	N-Channel	P-Channel	V_{DS}	Drain-Source Voltage	30	-30	V	V_{GS}	Gate-Source Voltage	± 20	± 20	V	$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{ V}$	9.5	-8.5	A	$I_D @ T_A = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{ V}$	6.5	-6	A	I_{DM}	Pulsed Drain Current	42	-40	A	EAS	Single Pulse Avalanche Energy	17	15	mJ	$P_D @ T_C = 25^\circ\text{C}$	Total Power Dissipation	3	2.8	W	T_{STG}	Storage Temperature Range	-55 to 175	55 to 175	$^\circ\text{C}$	T_J	Operating Junction Temperature Range	-55 to 175	55 to 175	$^\circ\text{C}$	Symbol	Parameter	Typ.	Max.	Unit	$R_{\theta JA}$	Thermal Resistance Junction-Ambient	41.7	44.6	$^\circ\text{C/W}$
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N-Channel 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	30	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =30V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _{DS} =0A	---	---	±100	nA
On Characteristics ³						
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	V _{GS} =10V,I _D =9.5A	---	18	28	m Ω
		V _{GS} =4.5V,I _D =5A	---	24	36	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	370	447	pF
C _{oss}	Output Capacitance		---	66	---	
C _{rss}	Reverse Transfer Capacitance		---	40	---	
Q _g	Gate Charge	V _{GS} =10V V _{DS} =15V I _D =9.5A		7.1	---	nC
Q _{gs}	Gate-Source Charge			1.2	---	
Q _{gd}	Gate-Drain Charge			1.6	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} =15V, R _L =2.1 Ω R _{REN} =3 Ω ,V _{GS} =10V	---	4.4	---	ns
t _r	Rise Time		---	2.6	---	ns
t _{d(off)}	Turn-Off Delay Time		---	14.8	---	ns
t _f	Fall Time		---	2.8	---	ns
Drain-Source Diode Characteristics						
I _S	Continuous Drain to Source Diode	VD=VG=0V	---	----	9.5	A
I _{SM}	Pulsed Drain to Source Diode	VD=VG=0V	---	---	42	A
V _{SD}	Source-Drain Diode Forward Voltage	V _{GS} =0V,I _S =9.5A	---	0.74	1	V
t _{rr}	Body Diode Reverse Recovery Time	I _F =9.5A,dI/dt=100A/ μ s	---	10.5	12.6	ns
Q _{rr}	Body Diode Reverse Recovery		---	4.5	---	nC

Notes:

- 1: The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10s$ thermal resistance rating.
- 2: Repetitive rating, pulse width limited by junction temperature.
- 3: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.
- 4: The static characteristics in Figures 1 to 6 are obtained using $<300\ \mu s$ pulses, duty cycle 0.5% max.

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Typical Performance Characteristics-N

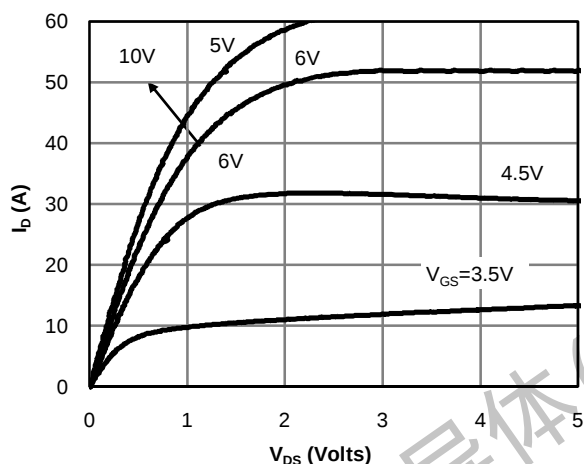


Fig 1: On-Region Characteristics

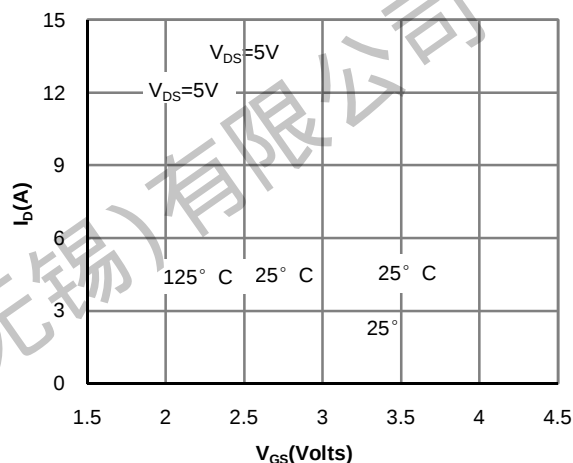


Figure 2: Transfer Characteristics

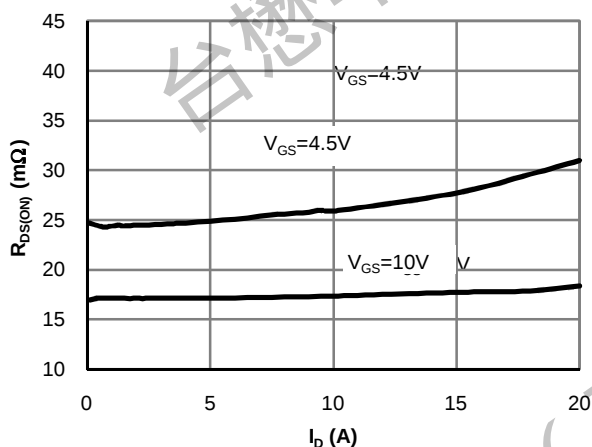


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

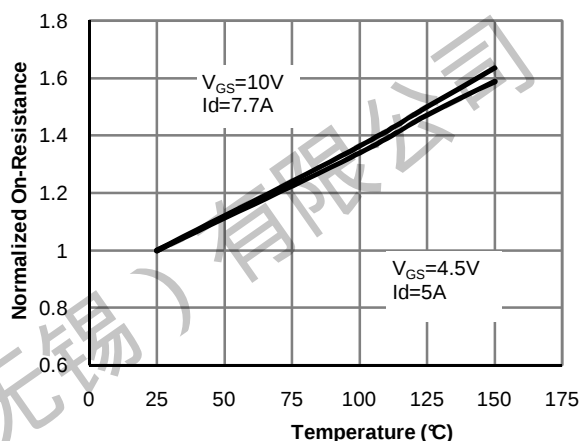
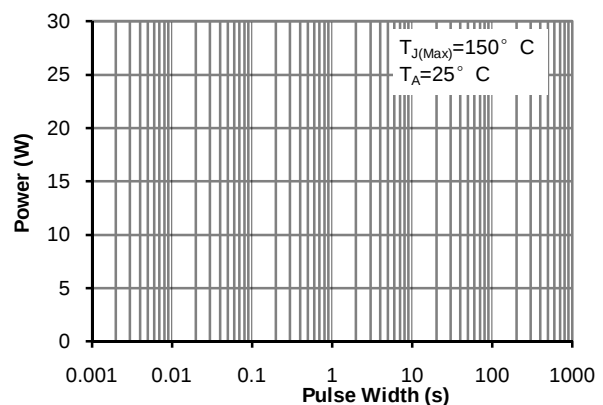
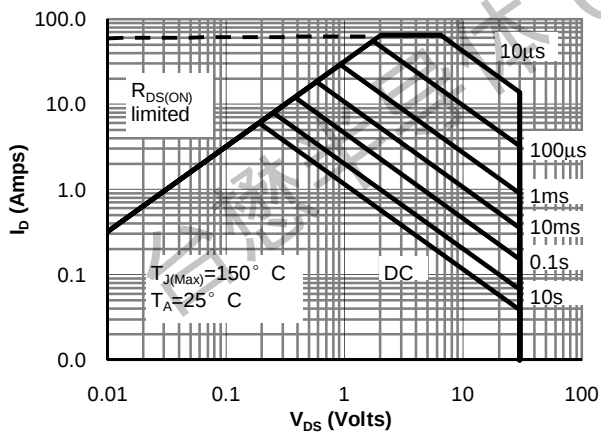
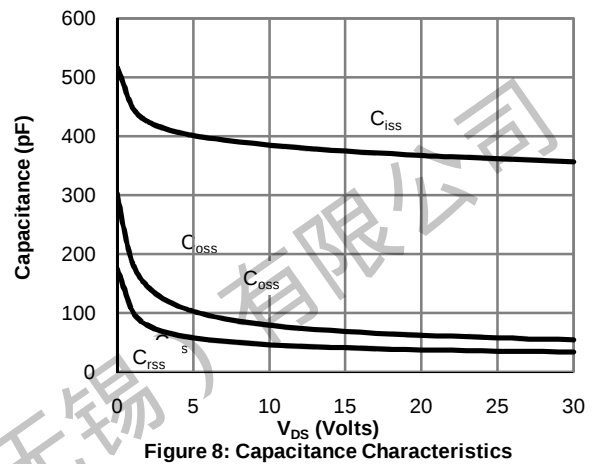
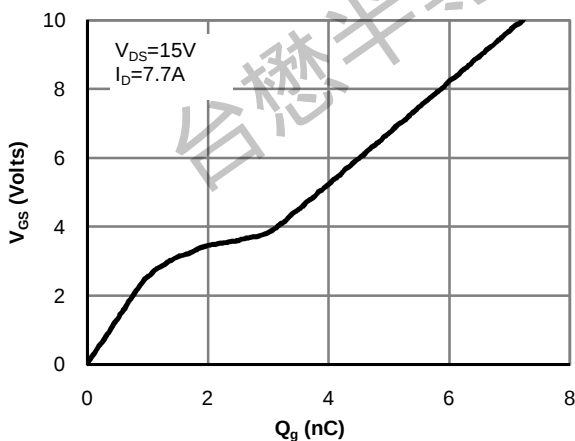
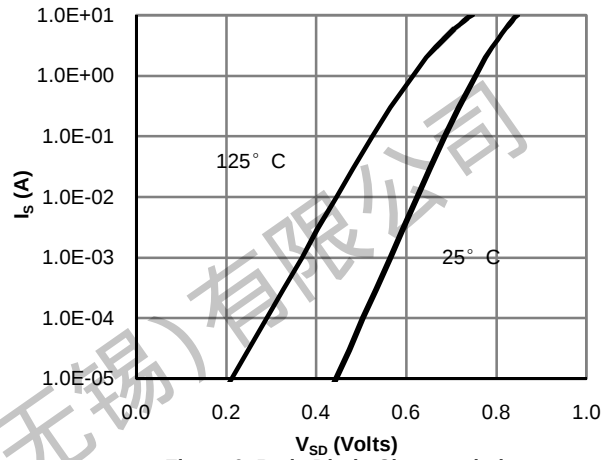
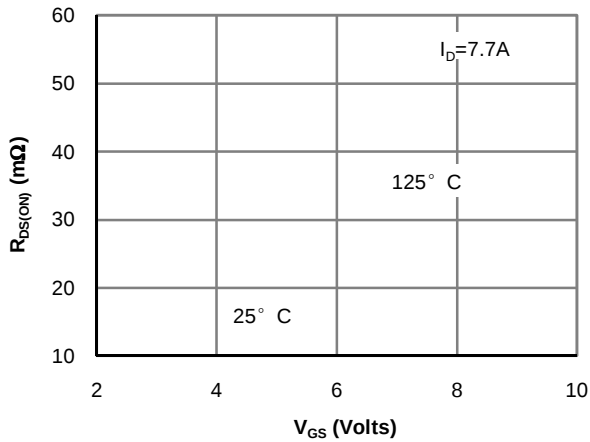


Figure 4: On-Resistance vs. Junction Temperature



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P-Channel 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 μ A	-30	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =-30V	---	---	-1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 20V, V _{DS} =0A	---	---	± 100	nA
On Characteristics ³						
V _{GS(th)}	GATE-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	-1	-1.5	-2	V
R _{DS(ON)}	Drain-Source On Resistance ^{note3}	V _{GS} =-10V, I _D =-8.5A	---	40	52	m Ω
		V _{GS} =-4.5V, I _D =-6A	---	56	65	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1MHz	---	759	---	pF
C _{oss}	Output Capacitance		---	139	---	
C _{rss}	Reverse Transfer Capacitance		---	94	---	
Switching Characteristics ⁴						
t _{d(on)}	Turn-On Delay Time	V _{DD} = -15V, R _{GEN} =3 Ω	---	7.9	---	ns
t _r	Rise Time		---	5.9	---	ns
t _{d(off)}	Turn-Off Delay Time	V _{GS} = -10V, R _D =15 Ω	---	46	---	ns
t _f	Fall Time		---	4	---	ns
Q _g	Total Gate Charge	V _{GS} =-10V, V _{DS} =-15V, I _D =-8.5A	---	13.5	15.9	nC
Q _{gs}	Gate-Source Charge		---	2.5	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	3.1	---	nC
Drain-Source Diode Characteristics						
I _S	Continuous Drain to Source Diode	VD=VG=0V	---	---	-8.5	A
I _{SM}	Pulsed Drain to Source Diode	VD=VG=0V	---	---	-40	---
V _{SD}	Source-Drain Diode Forward Voltage	V _{GS} =0V, I _S =-4.2A	---	-0.8	-1	V
T _{rr}	Reverse Recovery Time	T _J =25℃,	---	15	---	ns
Q _{rr}	Reverse Recovery Charge	I _F =-8.5A, dI/dt=-100A/ μ s	---	9.7	---	nC

Notes:

1: The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}\text{C}$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10s$ thermal resistance rating.

2: Repetitive rating, pulse width limited by junction temperature.

3: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

4: The static characteristics in Figures 1 to 6 are obtained using $<300\mu s$ pulses, duty cycle 0.5% max.

Typical Performance Characteristics-P

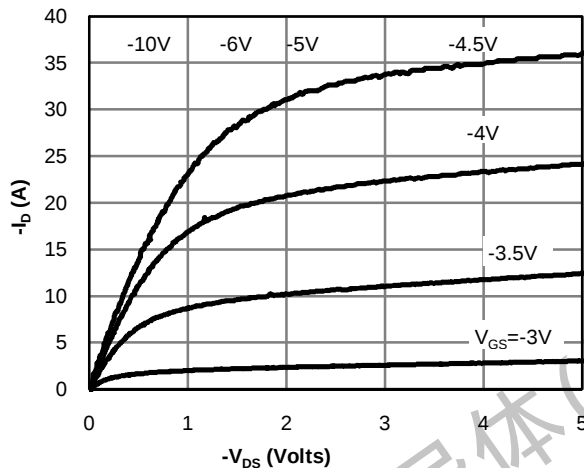


Fig 1: On-Region Characteristics

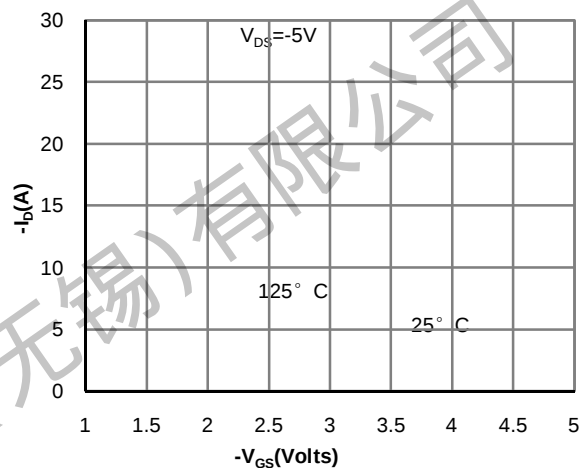


Figure 2: Transfer Characteristics

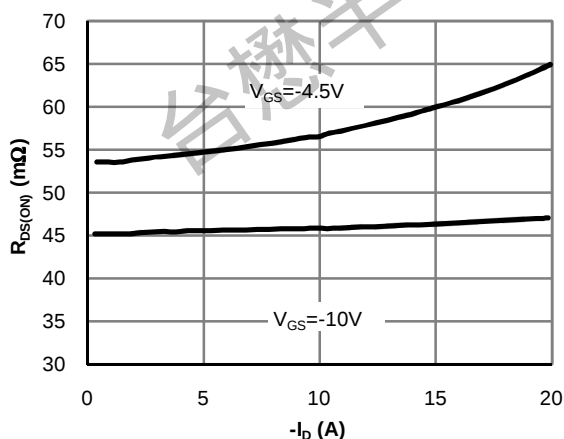


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

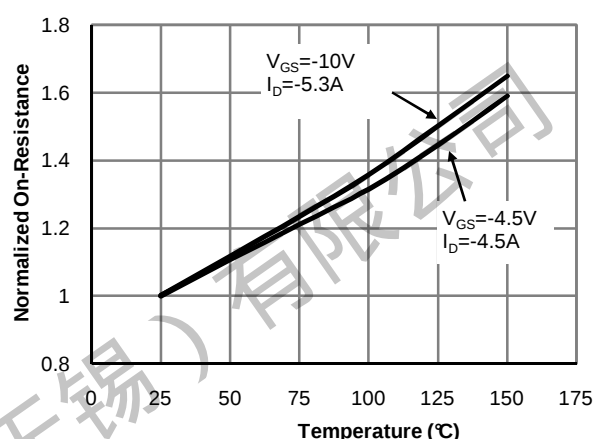


Figure 4: On-Resistance vs. Junction Temperature

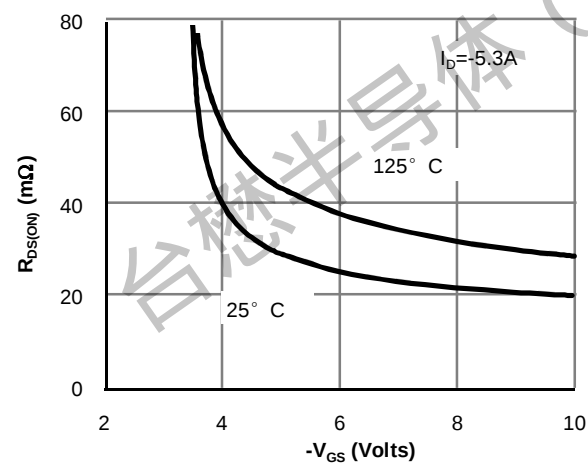


Figure 5: On-Resistance vs. Gate-Source Voltage

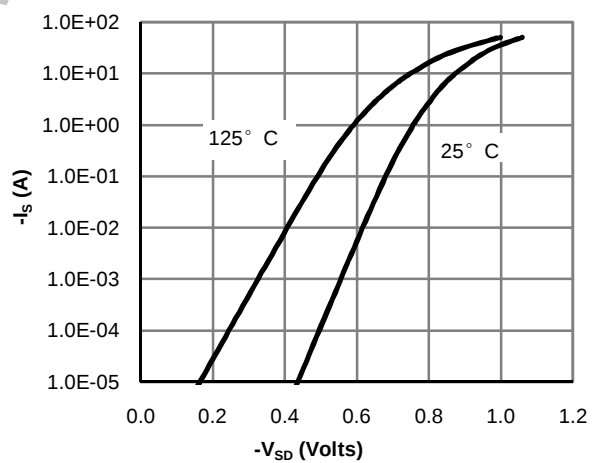
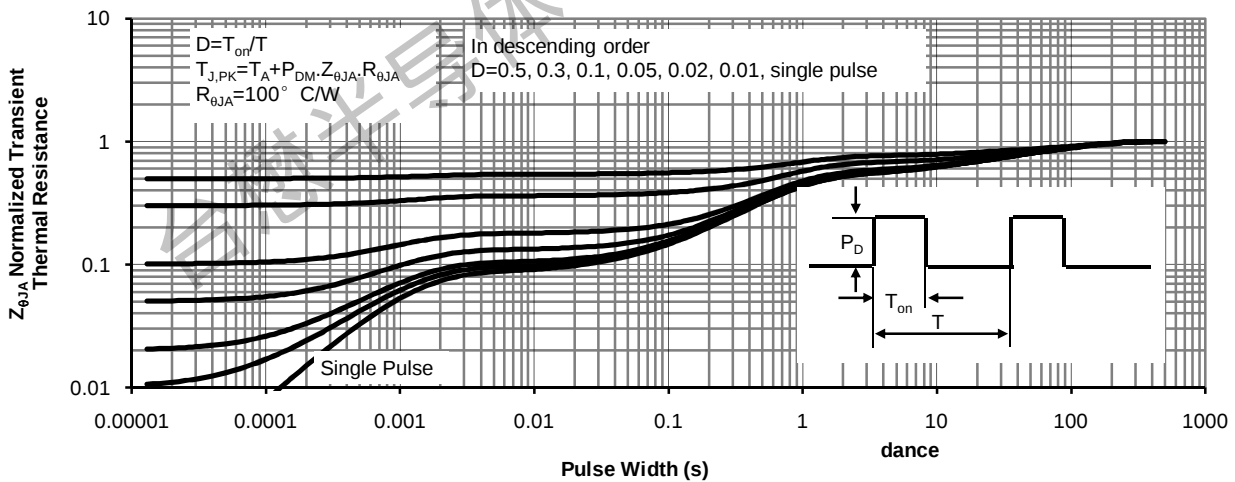
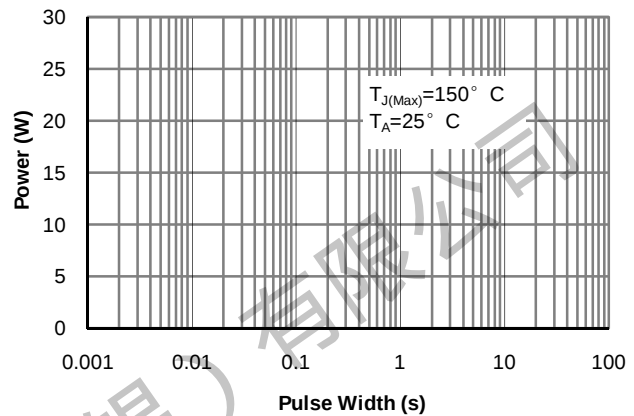
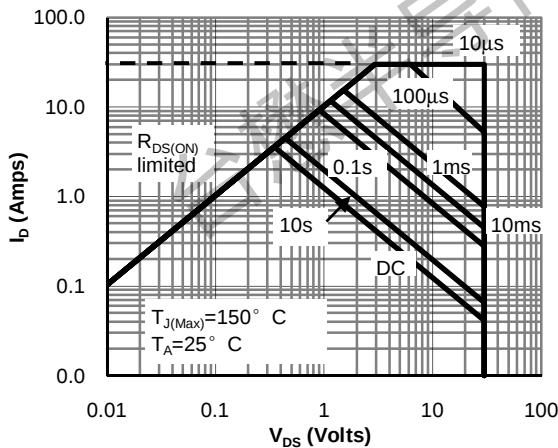
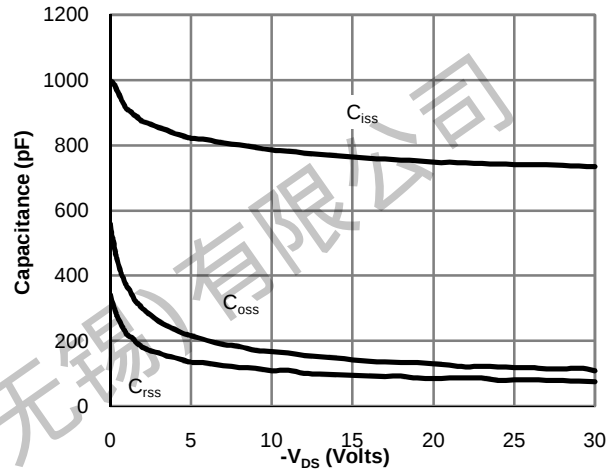
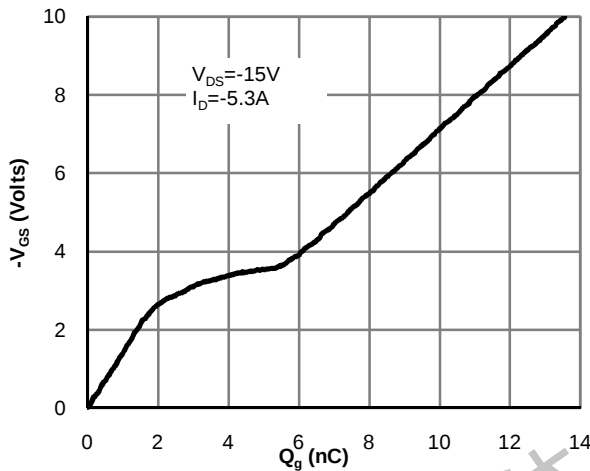


Figure 6: Body-Diode Characteristics



TM10G03DF

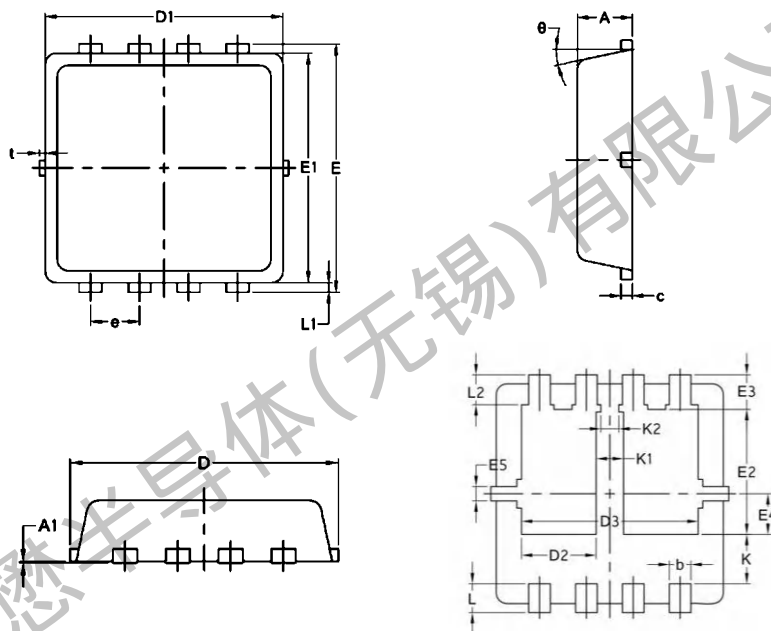
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Package Mechanical Data:DFN3x3-8L

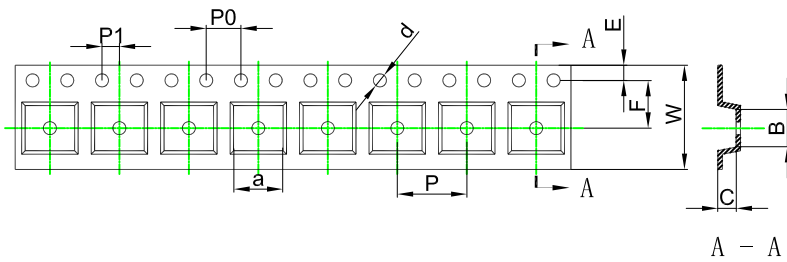


Symbol	Common		
	Mm		
	Min	Nom	Max
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.25	0.30	0.39
c	0.14	0.152	0.20
D	3.20	3.30	3.45
D1	3.05	3.15	3.25
D2	0.84	1.04	1.24
D3	2.30	2.45	2.60
E	3.20	3.30	3.40
E1	2.95	3.05	3.15
E2	1.60	1.74	1.90
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.50	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



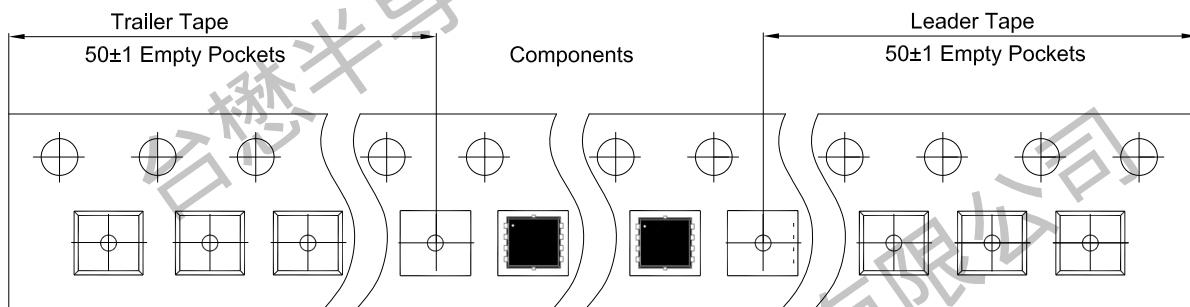
Packaging Description:

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).

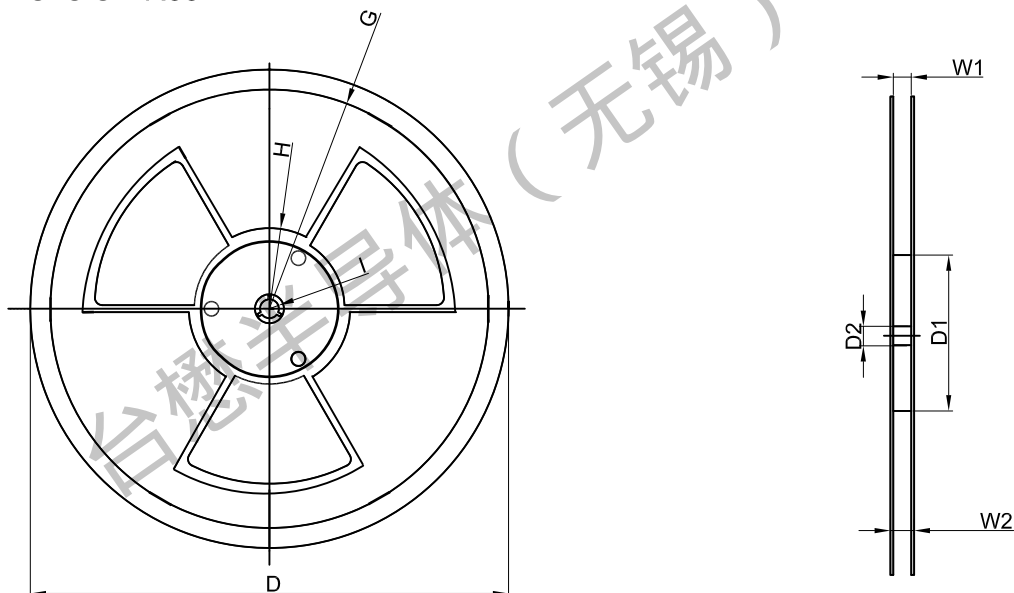
ALL DIM IN mm

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	

Important Notices and Disclaimers

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Revision history:

Date	Rev	Description	Page
2023.06.08	23.06	Original	