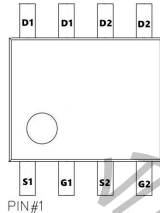
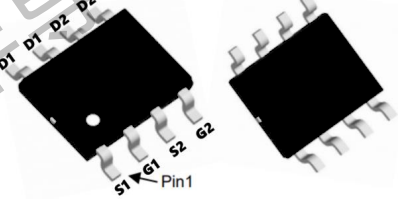
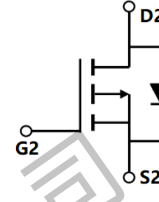
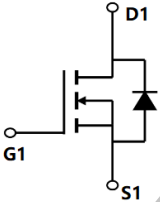




TM4614C

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} = 40V, I _D =6.3A R _{DS(ON)} =30mΩ (typ.) @ V _{GS} =10V P Channel V _{DS} = -40V, I _D = -5.9A R _{DS(ON)} =68mΩ (typ.) @ V _{GS} =-10V 100% UIS Tested 100% R _g Tested																																																									
S:SOP-8L    Marking: 4614C																																																										
Absolute Maximum Ratings (T _A =25℃ 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>40</td><td>-40</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℃</td><td>Continuous Drain Current, V_{GS} @ 10V¹</td><td>6.3</td><td>-5.9</td><td>A</td></tr><tr><td>I_D@T_A=70℃</td><td>Continuous Drain Current, V_{GS} @ 10V¹</td><td>4.1</td><td>-3.8</td><td>A</td></tr><tr><td>I_{DM}</td><td>Pulsed Drain Current²</td><td>23</td><td>-22</td><td>A</td></tr><tr><td>EAS</td><td>Single Pulse Avalanche Energy³</td><td>16.2</td><td>39</td><td>mJ</td></tr><tr><td>I_{AS}</td><td>Avalanche Current</td><td>6.8</td><td>-6.2</td><td>A</td></tr><tr><td>P_D@T_A=25℃</td><td>Total Power Dissipation⁴</td><td>1.67</td><td>1.67</td><td>W</td></tr><tr><td>T_{STG}</td><td>Storage Temperature Range</td><td>-55 to 150</td><td>-55 to 150</td><td>℃</td></tr><tr><td>T_J</td><td>Operating Junction Temperature Range</td><td>-55 to 150</td><td>-55 to 150</td><td>℃</td></tr></table>		Symbol	Parameter	Rating		Units	N-Channel	P-Channel	V _{DS}	Drain-Source Voltage	40	-40	V	V _{GS}	Gate-Source Voltage	±20	±20	V	I _D @T _A =25℃	Continuous Drain Current, V _{GS} @ 10V ¹	6.3	-5.9	A	I _D @T _A =70℃	Continuous Drain Current, V _{GS} @ 10V ¹	4.1	-3.8	A	I _{DM}	Pulsed Drain Current ²	23	-22	A	EAS	Single Pulse Avalanche Energy ³	16.2	39	mJ	I _{AS}	Avalanche Current	6.8	-6.2	A	P _D @T _A =25℃	Total Power Dissipation ⁴	1.67	1.67	W	T _{STG}	Storage Temperature Range	-55 to 150	-55 to 150	℃	T _J	Operating Junction Temperature Range	-55 to 150	-55 to 150	℃
Symbol	Parameter			Rating			Units																																																			
		N-Channel	P-Channel																																																							
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Thermal Data																																																										
<table><tr><th>Symbol</th><th>Parameter</th><th>Typ.</th><th>Max.</th><th>Unit</th></tr><tr><td>R_{θJA}</td><td>Thermal Resistance Junction-Ambient ¹</td><td>---</td><td>75</td><td>℃/W</td></tr><tr><td>R_{θJC}</td><td>Thermal Resistance Junction-Case¹</td><td>---</td><td>30</td><td>℃/W</td></tr></table>		Symbol	Parameter	Typ.	Max.	Unit	R _{θJA}	Thermal Resistance Junction-Ambient ¹	---	75	℃/W	R _{θJC}	Thermal Resistance Junction-Case ¹	---	30	℃/W																																										
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TM4614C

N+P-Channel Enhancement Mode Mosfet

N-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	40	44	---	V
$\Delta BVDSS/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	0.032	---	V/ $^\circ\text{C}$
RDS(ON)	Static Drain-Source On-Resistance ²	$V_{GS}=10V$, $I_D=4A$	---	30	39	m Ω
		$V_{GS}=4.5V$, $I_D=3A$	---	40	48	
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.0	1.7	2.2	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-4.5	---	mV/ $^\circ\text{C}$
IDSS	Drain-Source Leakage Current	$V_{DS}=32V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=32V$, $V_{GS}=0V$, $T_J=55^\circ\text{C}$	---	---	5	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
gfs	Forward Transconductance	$V_{DS}=5V$, $I_D=4A$	---	8	---	S
R _g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	2.4	4.8	Ω
Q _g	Total Gate Charge (4.5V)	$V_{DS}=15V$, $V_{GS}=4.5V$, $I_D=3A$	---	5	---	nC
Q _{gs}	Gate-Source Charge		---	1.54	---	
Q _{gd}	Gate-Drain Charge		---	1.84	---	
Td(on)	Turn-On Delay Time	$V_{DD}=15V$, $V_{GS}=10V$, $R_G=3.3\Omega$ $I_D=1A$	---	7.8	---	ns
T _r	Rise Time		---	2.1	---	
Td(off)	Turn-Off Delay Time		---	29	---	
T _f	Fall Time		---	2.1	---	
Ciss	Input Capacitance	$V_{DS}=15V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	452	---	pF
Coss	Output Capacitance		---	51	---	
Crss	Reverse Transfer Capacitance		---	38	---	
IS	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	6.3	A
ISM	Pulsed Source Current ^{2,4}		---	---	23	A
VSD	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=1A$, $T_J=25^\circ\text{C}$	---	---	1.2	V

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- 2、The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3、The power dissipation is limited by 150°C junction temperature
- 4、The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

TM4614C

N+P-Channel Enhancement Mode Mosfet

P-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40	-44	---	V
$\Delta BVDSS/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=-1mA$	---	-0.018	---	V/ $^\circ\text{C}$
RDS(ON)	Static Drain-Source On-Resistance ²	$V_{GS}=-10V, I_D=-3A$	---	68	77	m Ω
		$V_{GS}=-4.5V, I_D=-2A$	---	76	88	
VGS(th)	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	-1.7	-2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	2.5	---	mV/ $^\circ\text{C}$
IDSS	Drain-Source Leakage Current	$V_{DS}=-40V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	μA
		$V_{DS}=-40V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	-5	
IGSS	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
gfs	Forward Transconductance	$V_{DS}=-5V, I_D=-3A$	---	5.8	---	S
Qg	Total Gate Charge (-4.5V)	$V_{DS}=-32V, V_{GS}=-4.5V, I_D=-3A$	---	6.4	---	nC
Qgs	Gate-Source Charge		---	2.1	---	
Qgd	Gate-Drain Charge		---	2.5	---	
Td(on)	Turn-On Delay Time	$V_{DD}=-20V, V_{GS}=-4.5V, R_G=3.3\Omega, I_D=-3A$	---	4.2	---	ns
Tr	Rise Time		---	23	---	
Td(off)	Turn-Off Delay Time		---	26.8	---	
Tf	Fall Time		---	20.6	---	
Ciss	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1MHz$	---	620	---	pF
Coss	Output Capacitance		---	65	---	
Crss	Reverse Transfer Capacitance		---	53	---	
IS	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	-5.9	A
ISM	Pulsed Source Current ^{2,4}		---	---	-22	A
VSD	Diode Forward Voltage ²	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1	V

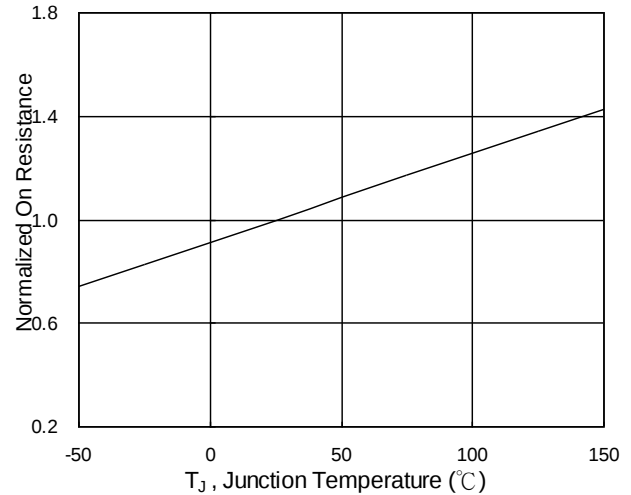
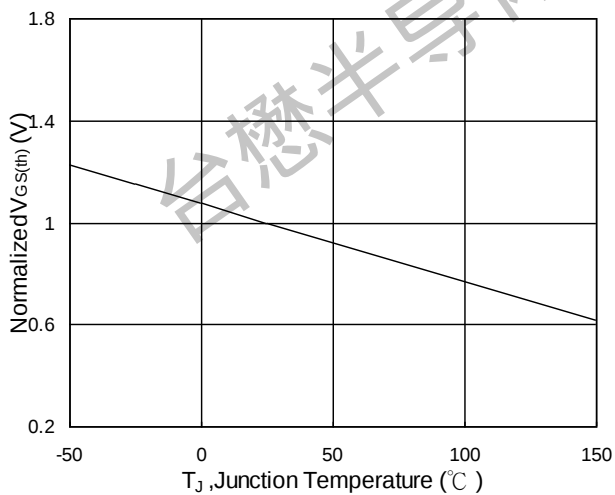
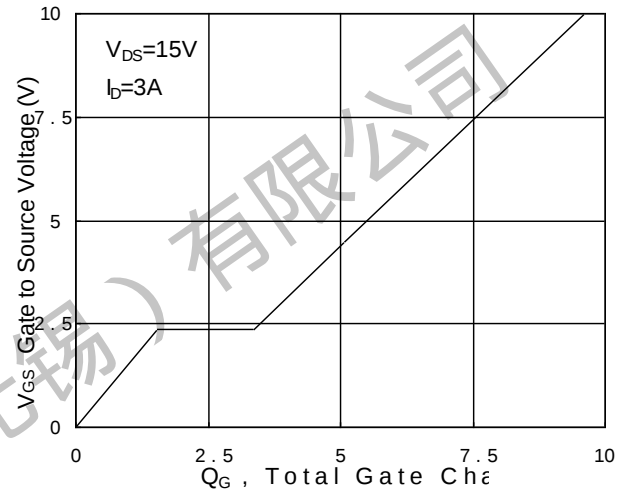
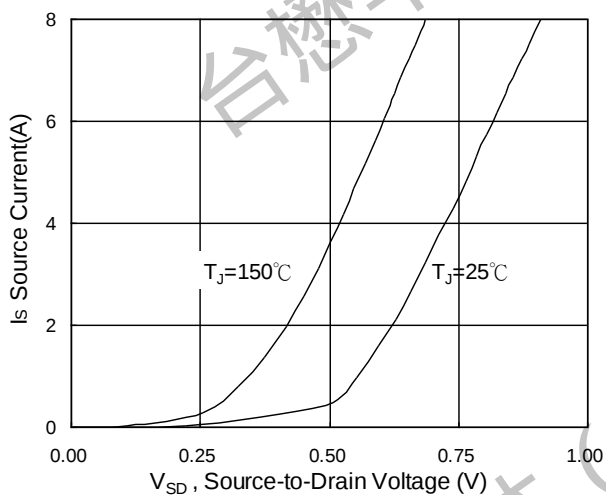
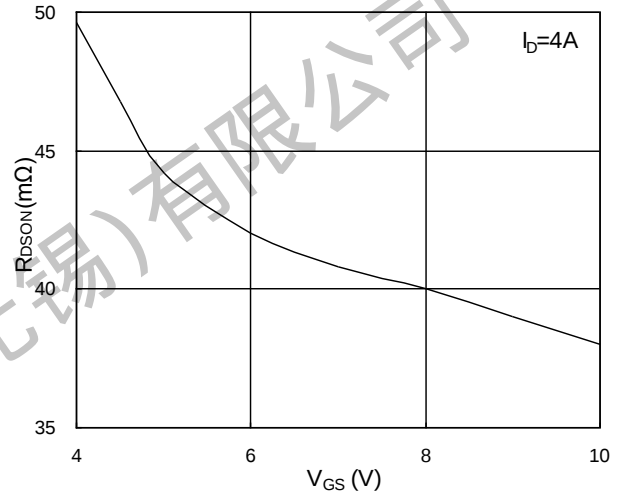
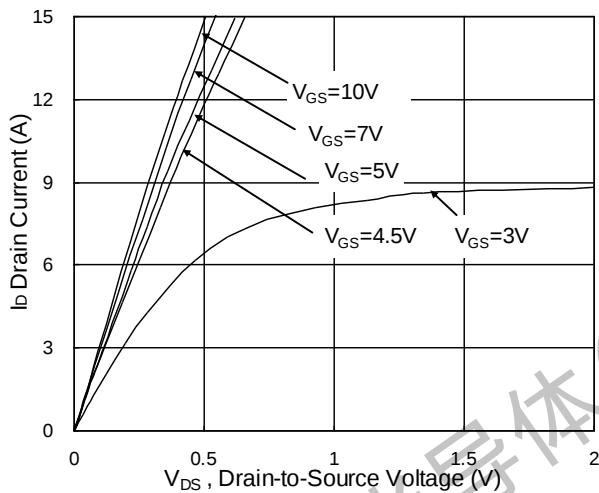
Note :

1. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The power dissipation is limited by 150°C junction temperature
4. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

TM4614C

N+P-Channel Enhancement Mode Mosfet

N-Typical Characteristics



TM4614C

N+P-Channel Enhancement Mode Mosfet

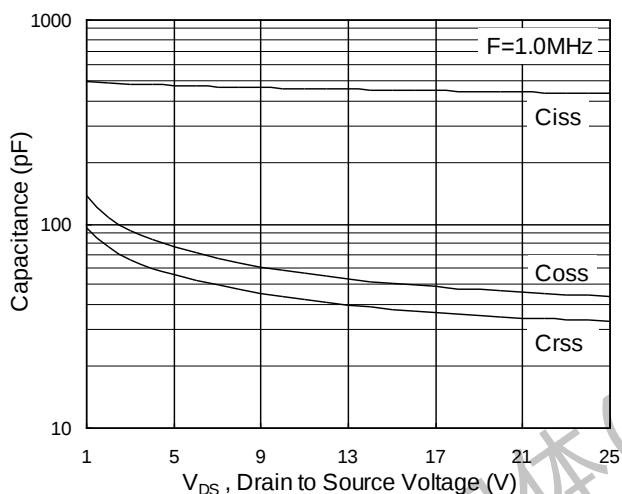


Fig.7 Capacitance

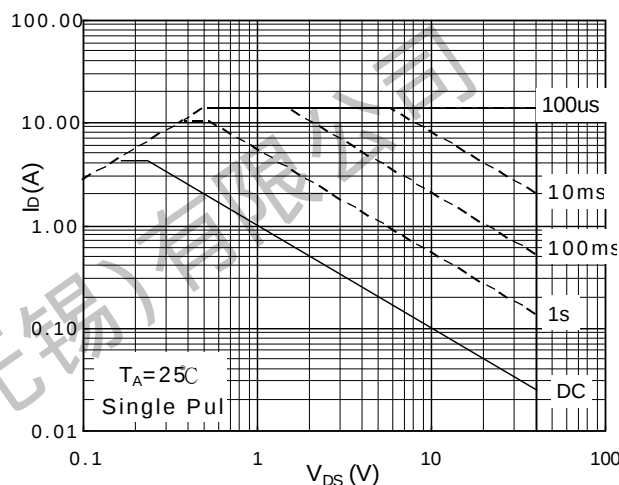


Fig.8 Safe Operating Area

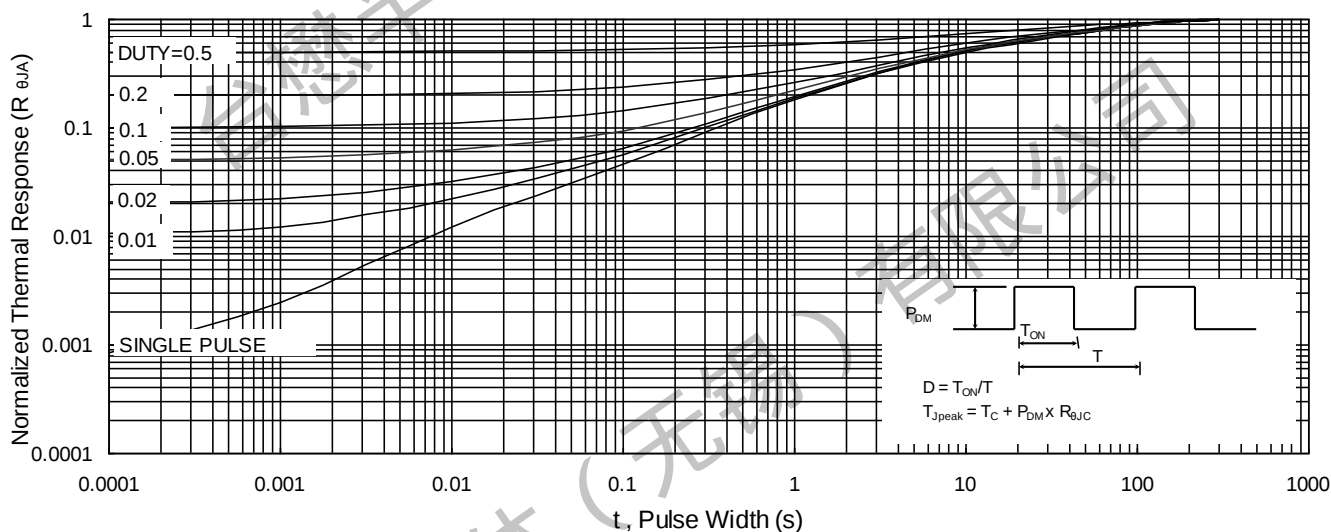


Fig.9 Normalized Maximum Transient Thermal Impedance

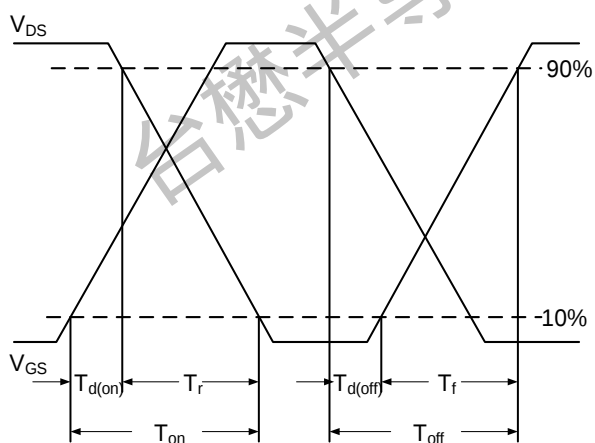


Fig.10 Switching Time Waveform

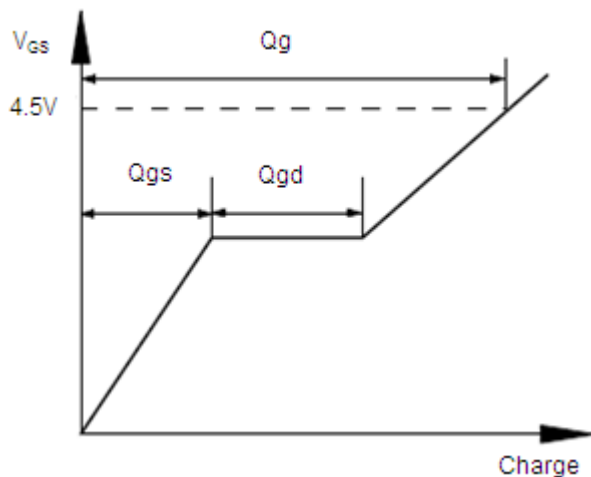


Fig.11 Gate Charge Waveform



TM4614C

N+P-Channel Enhancement Mode Mosfet

P-Typical Characteristics

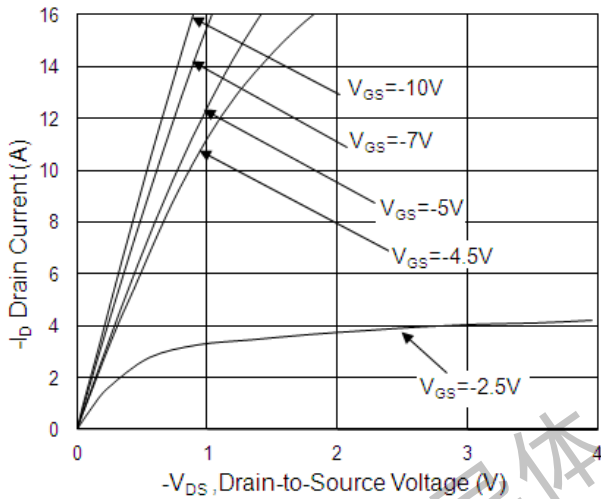


Fig.1 Typical Output Characteristics

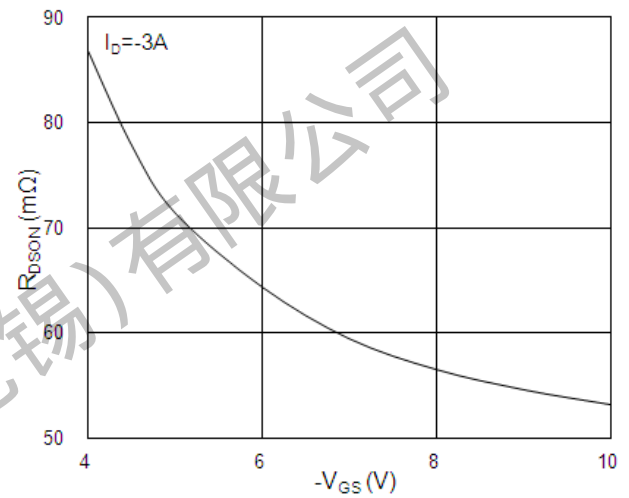


Fig.2 On-Resistance vs. G-S Voltage

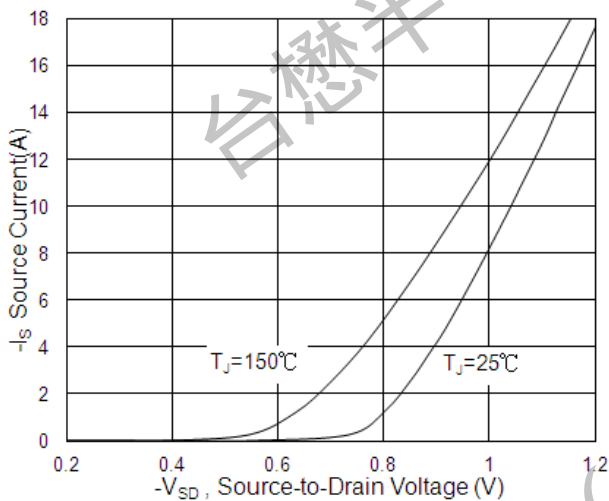


Fig.3 Forward Characteristics Of Reverse

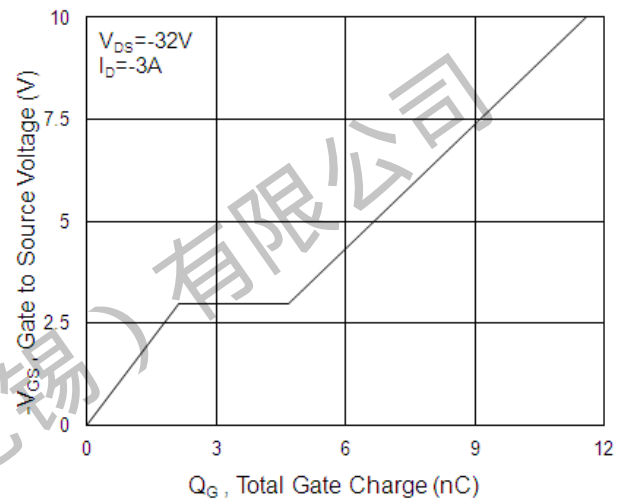


Fig.4 Gate-Charge Characteristics

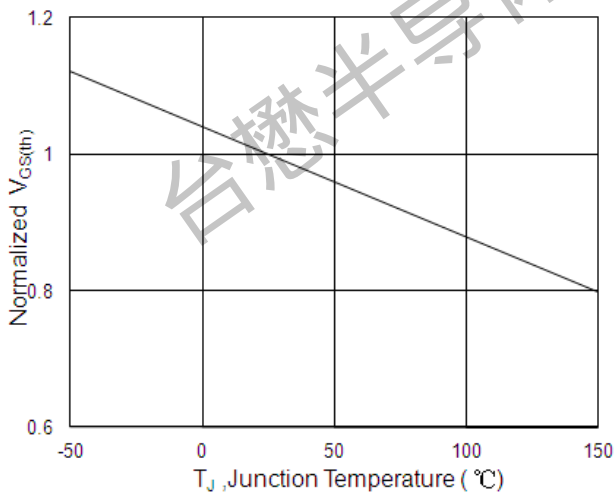


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

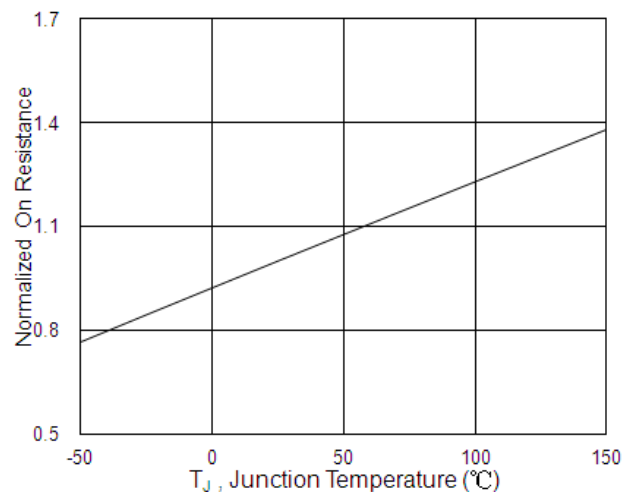


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

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N+P-Channel Enhancement Mode Mosfet

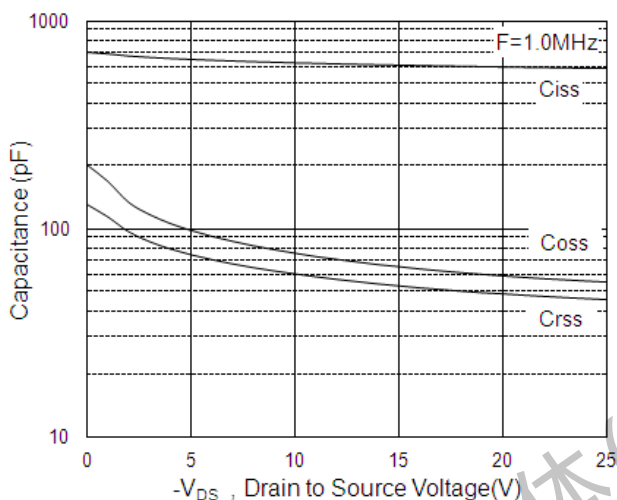


Fig.7 Capacitance

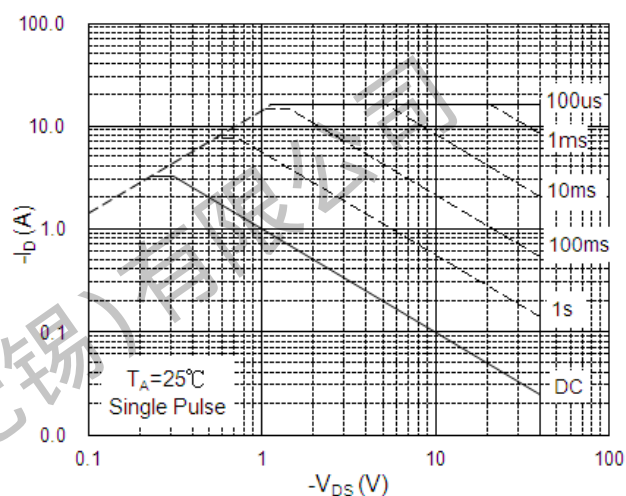


Fig.8 Safe Operating Area

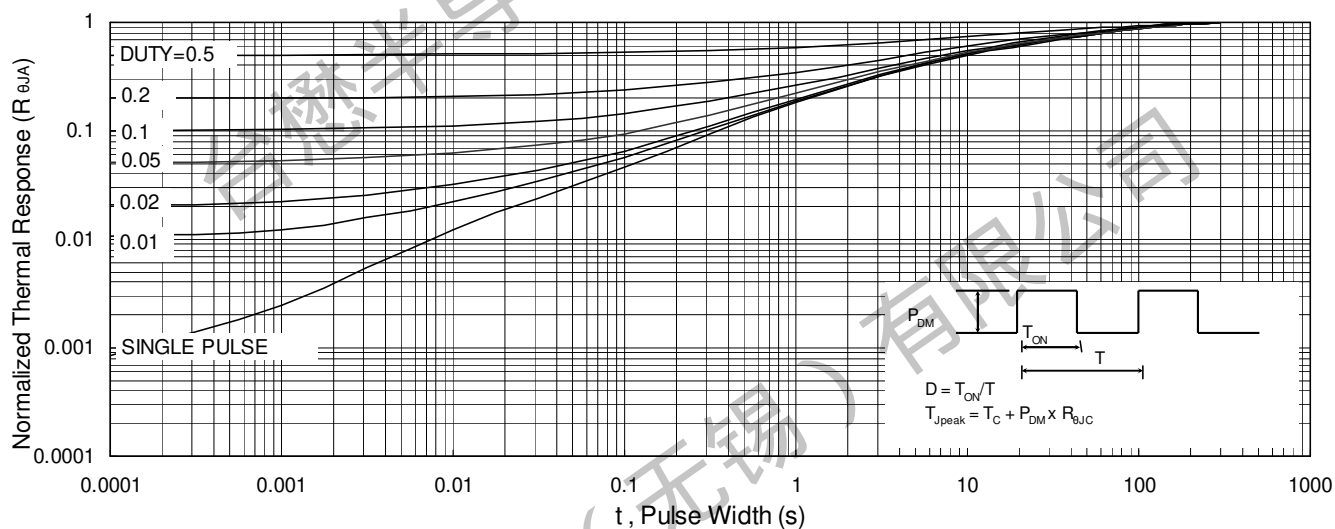


Fig.9 Normalized Maximum Transient Thermal Impedance

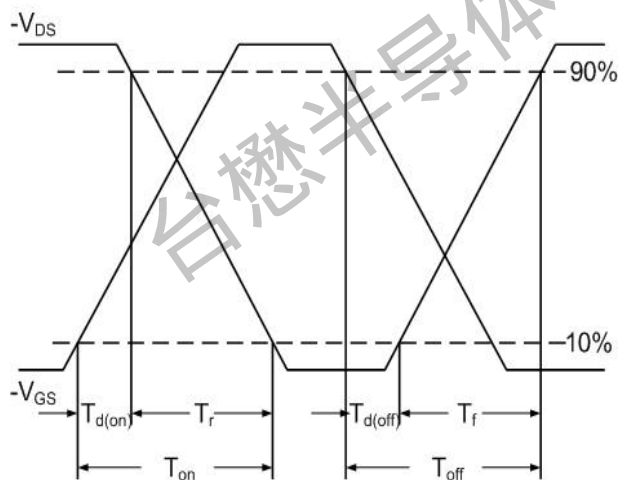


Fig.10 Switching Time Waveform

Data and specifications subject to change without notice.

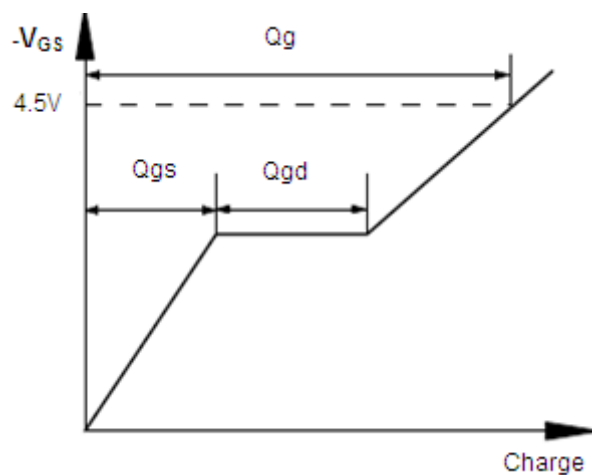
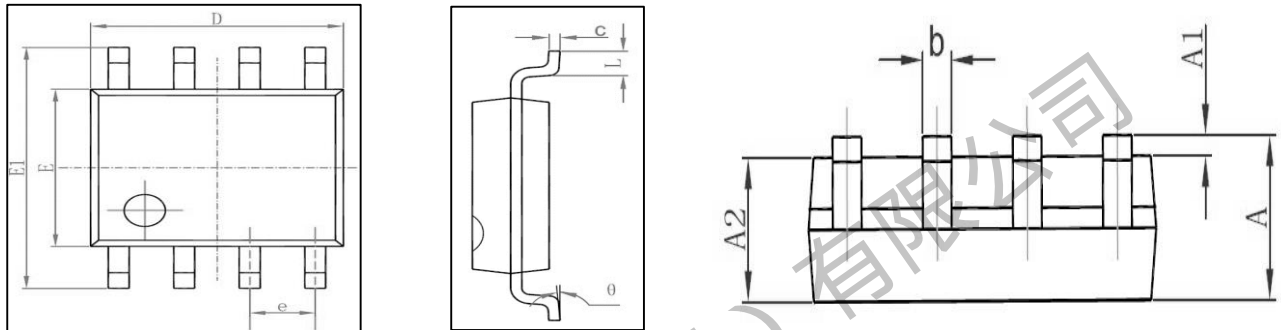


Fig.11 Gate Charge Waveform

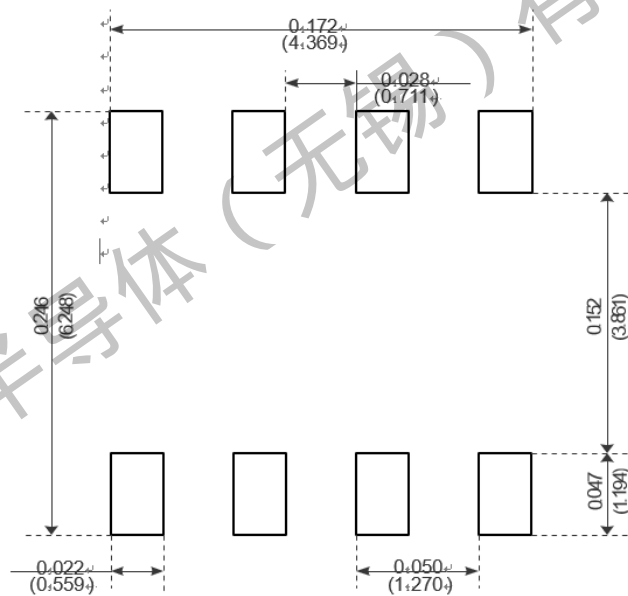
TM4614C

N+P-Channel Enhancement Mode Mosfet

Package Mechanical Data:SOP-8L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

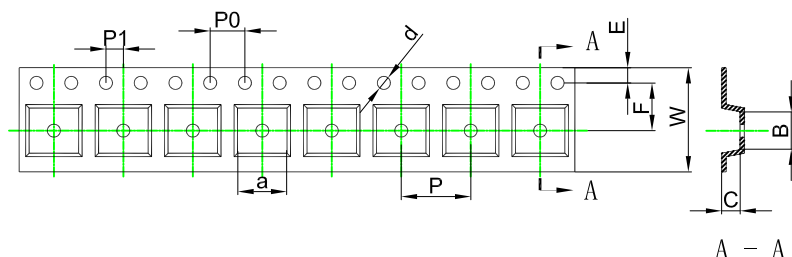


Recommended Minimum Pads

TM4614C

N+P-Channel Enhancement Mode Mosfet

SOP-8L Embossed Carrier Tape



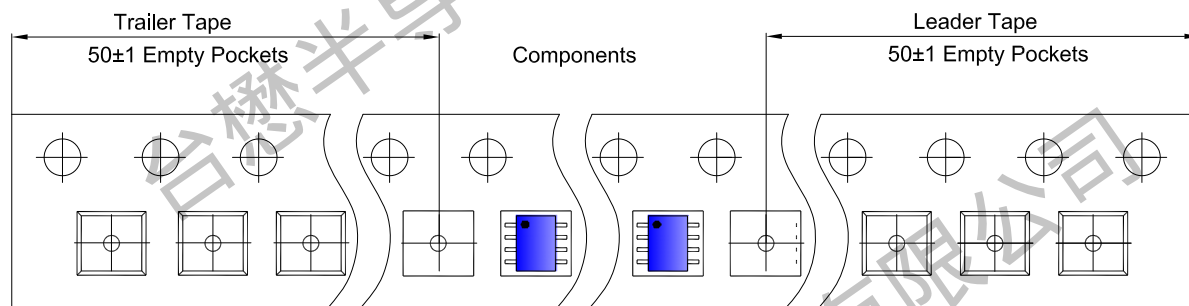
Packaging Description:

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).

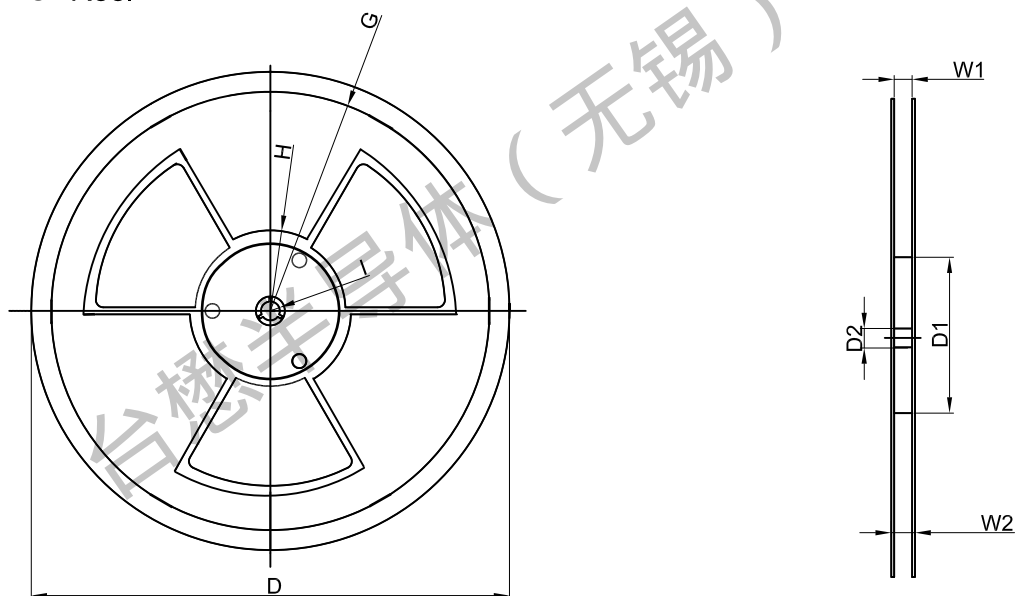
ALL DIM IN mm

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

SOP-8L Tape Leader and Trailer



SOP-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)
3,000 pcs	13 inch	6,000 pcs	370×355×52	48,000 pcs	400×360×368	

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Revision history:

Date	Rev	Description	Page
2023.08.10	23.08	Original	