TM4614CMI6

N+P-Channel Enhancement Mode Mosfet

General Description

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

Applications

- Load switch
- PWM

General Features

N Channl

V_{DS} =40V, I_D =5.8A

$R_{DS(ON)}$=30mΩ(Typ.) @ V_{GS}=10V

P Channl

V_{DS} =-40V I_D = -4.9A

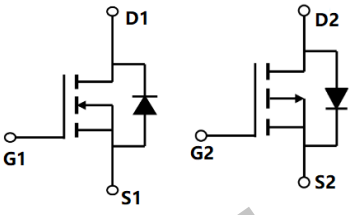
$R_{DS(ON)}$=77mΩ(Typ.) @ V_{GS}=-10V

100% UIS Tested

100% R_g Tested

Green Product

MI6:SOT-23-6L



Marking: 4614C

Absolute Maximum Ratings: (T_C=25℃ unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D	Continuous Drain Current-TC=25℃	5.8	-4.9	A
	Continuous Drain Current-TC=100℃	3	-2.7	
I_{DM}	300μs Pulsed Drain Current	25.2	-16.8	A
P_D	Power Dissipation	1.83	1.83	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +175		℃

Thermal Characteristics:

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	---	68	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	---	℃/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=250μA	40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V T_J=25℃			1	μA
		V_{DS}=40V, V_{GS}=0V T_J=125℃			100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V, V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	1.2	1.6	2.0	V
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=5A		6		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=5A T_J=25℃		30	35	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=4.5V, I_D=4A T_J=25℃		40	50	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1.0MHz		777		pF
C_{oss}	Output Capacitance			55		pF
C_{rss}	Reverse Transfer Capacitance			34		pF
Switching Parameters						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=10V, V_{DS}=20V, R_L=3.3Ω, R_{GEN}=3Ω		5		nS
t_r	Turn-on Rise Time			2.5		nS
$t_{d(off)}$	Turn-Off Delay Time			18		nS
t_f	Turn-Off Fall Time			2.6		nS
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=20V, I_D=5A		10		nC
Q_{gs}	Gate-Source Charge			2.7		nC
Q_{gd}	Gate-Drain Charge			2.6		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current (Body Diode)				5.8	A
V_{SD}	Forward on Voltage	V_{GS}=0V, I_S=5A			1.2	V

N-Channel Typical Electrical And Thermal Characteristics (Curves)

Figure 1. Output Characteristics

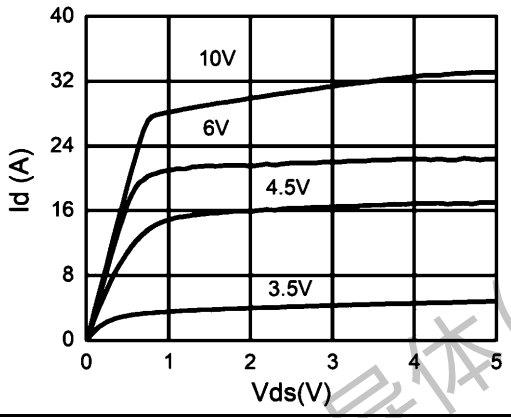


Figure 2. Transfer Characteristics

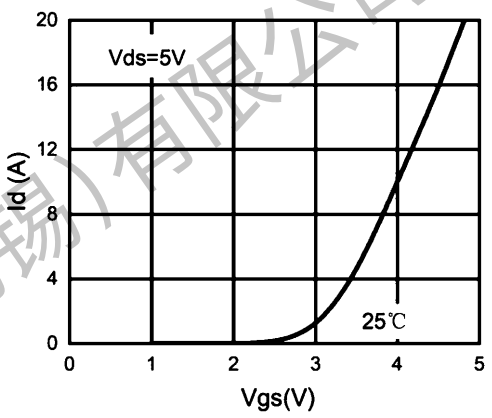


Figure 3. Power Dissipation

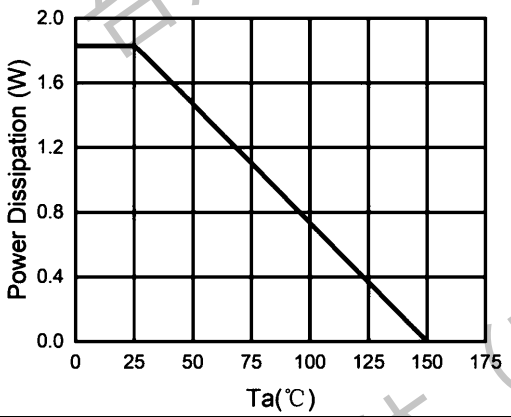


Figure 4. Drain Current

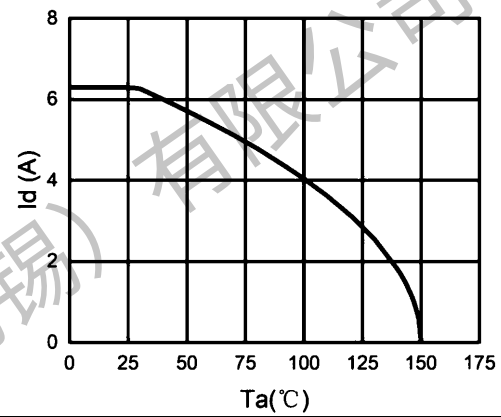


Figure 5. BV_{DSS} vs Junction Temperature

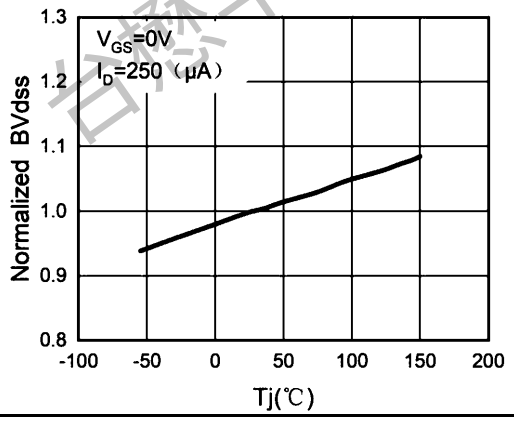


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

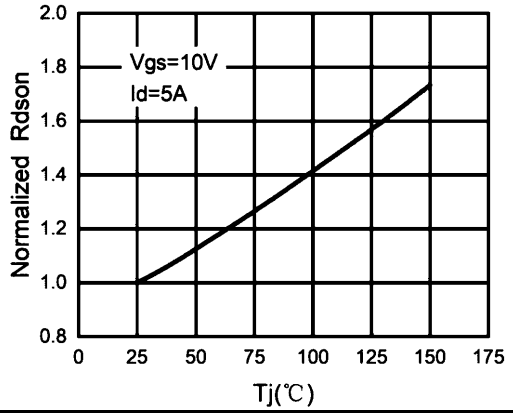


Figure 7. Gate Charge Waveforms

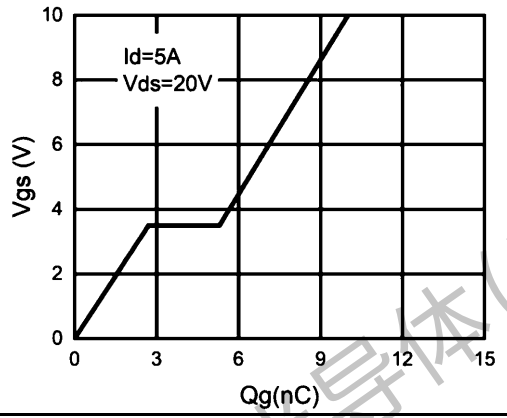


Figure 8. Capacitance

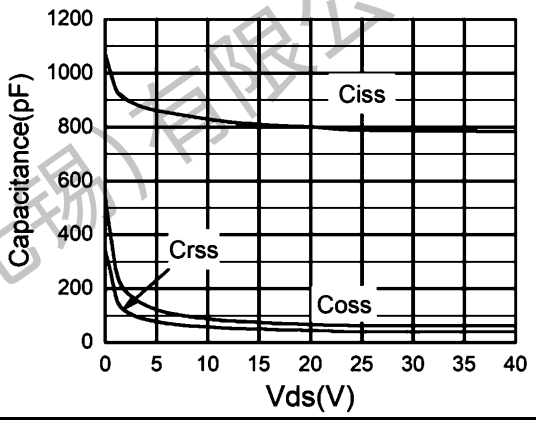


Figure 9. Body-Diode Characteristics

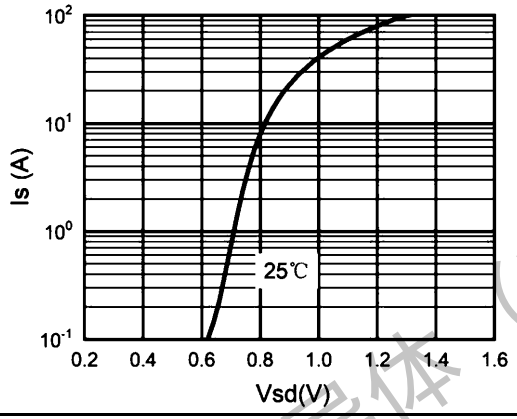
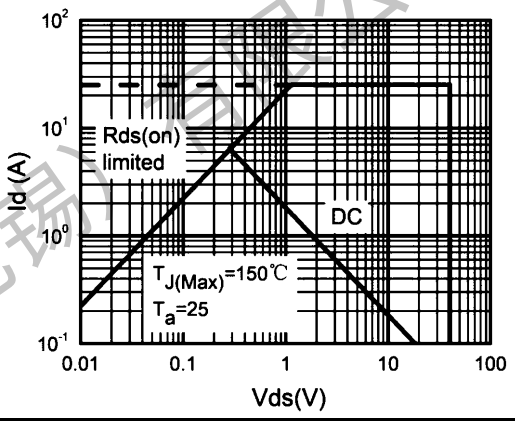


Figure 10. Maximum Safe Operating Area



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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=-250μA	-40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-40V, V_{GS}=0V T_J=25℃			-1	μA
		V_{DS}=-40V, V_{GS}=0V T_J=125℃			-100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V, V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250μA	-1.0	-1.75	-2.5	V
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-4A		8		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-10V, I_D=-4A T_J=25℃		77	82	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V, I_D=-3A T_J=25℃		95	100	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=-20V,V_{GS}=0V, f=1.0MHz		900		pF
C_{oss}	Output Capacitance			61		pF
C_{rss}	Reverse Transfer Capacitance			45		pF
Switching Parameters						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=-10V, V_{DS}=-20V, R_L=5Ω, R_{GEN}=3Ω		7.5		nS
t_r	Turn-on Rise Time			3.5		nS
$t_{d(off)}$	Turn-Off Delay Time			18		nS
t_f	Turn-Off Fall Time			4.5		nS
Q_g	Total Gate Charge	V_{GS}=-10V, V_{DS}=-20V, I_D=-4A		11		nC
Q_{gs}	Gate-Source Charge			3.3		nC
Q_{gd}	Gate-Drain Charge			2.7		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current (Body Diode)				-4.9	A
V_{SD}	Forward on Voltage	V_{GS}=0V, I_S=-4A			-1.2	V

P-Channel Typical Electrical And Thermal Characteristics (Curves)

Figure 1. Output Characteristics

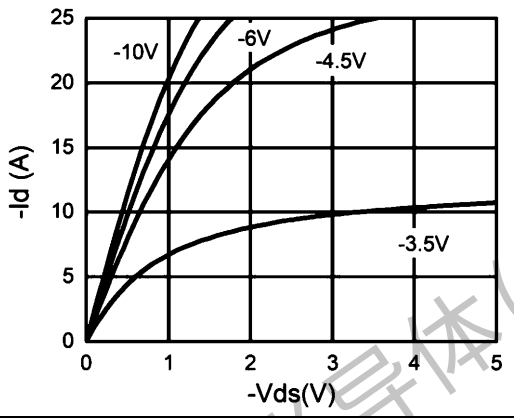


Figure 2. Transfer Characteristics

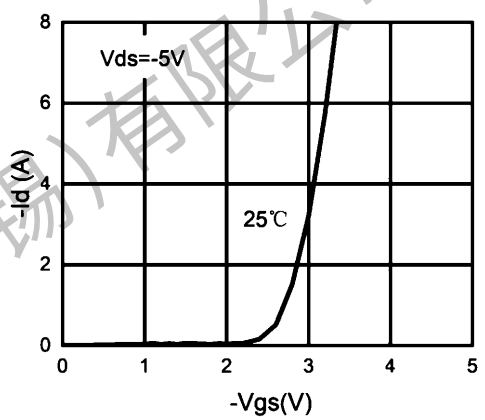


Figure 3. Power Dissipation

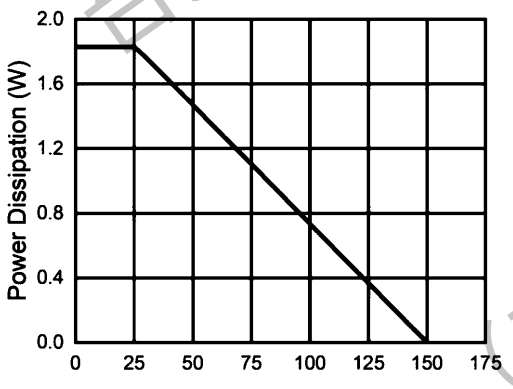


Figure 4. Drain Current

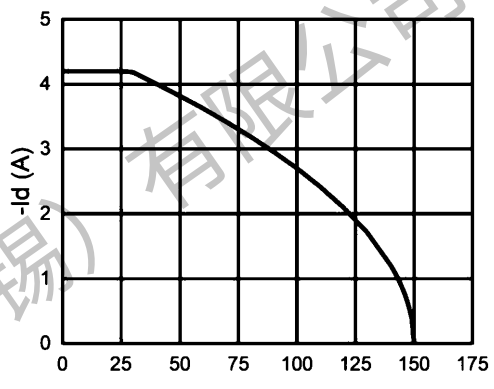


Figure 5. BV_{DSS} vs Junction Temperature

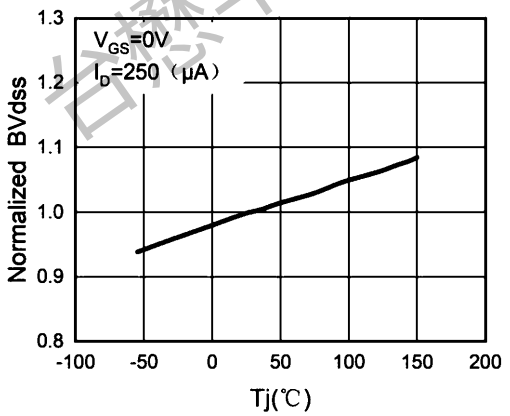


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

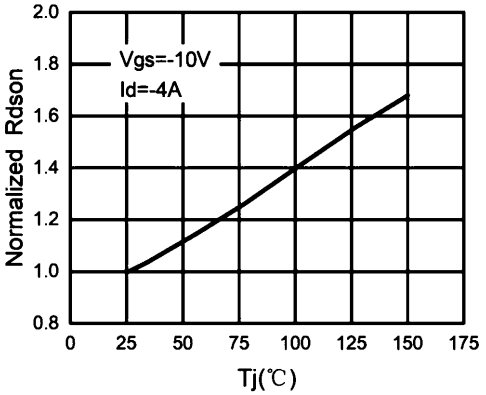


Figure 7. Gate Charge Waveforms

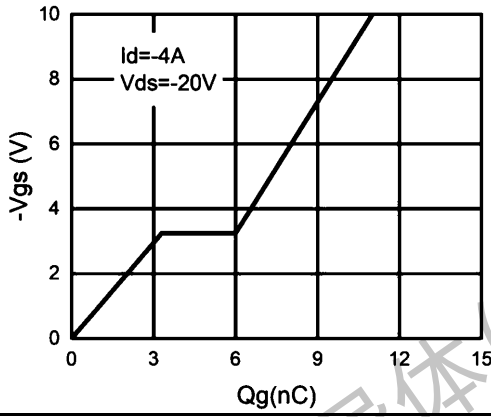


Figure 8. Capacitance

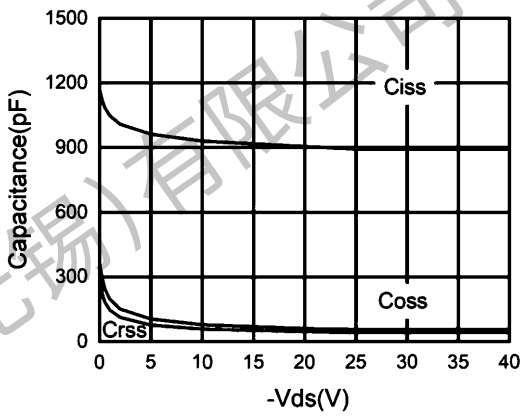


Figure 9. Body-Diode Characteristics

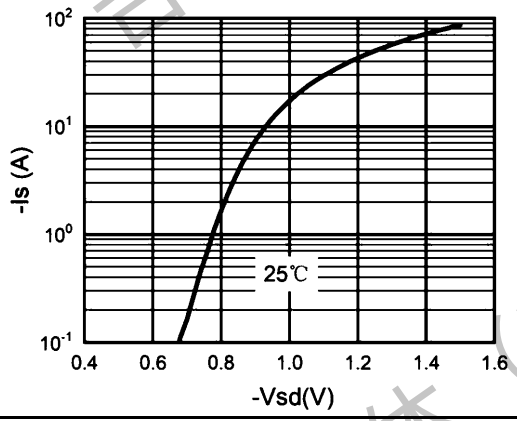
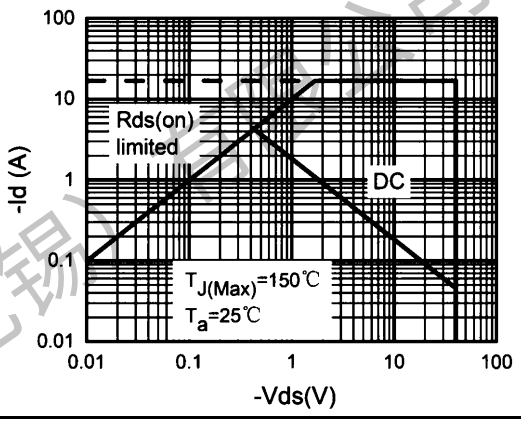


Figure 10. Maximum Safe Operating Area



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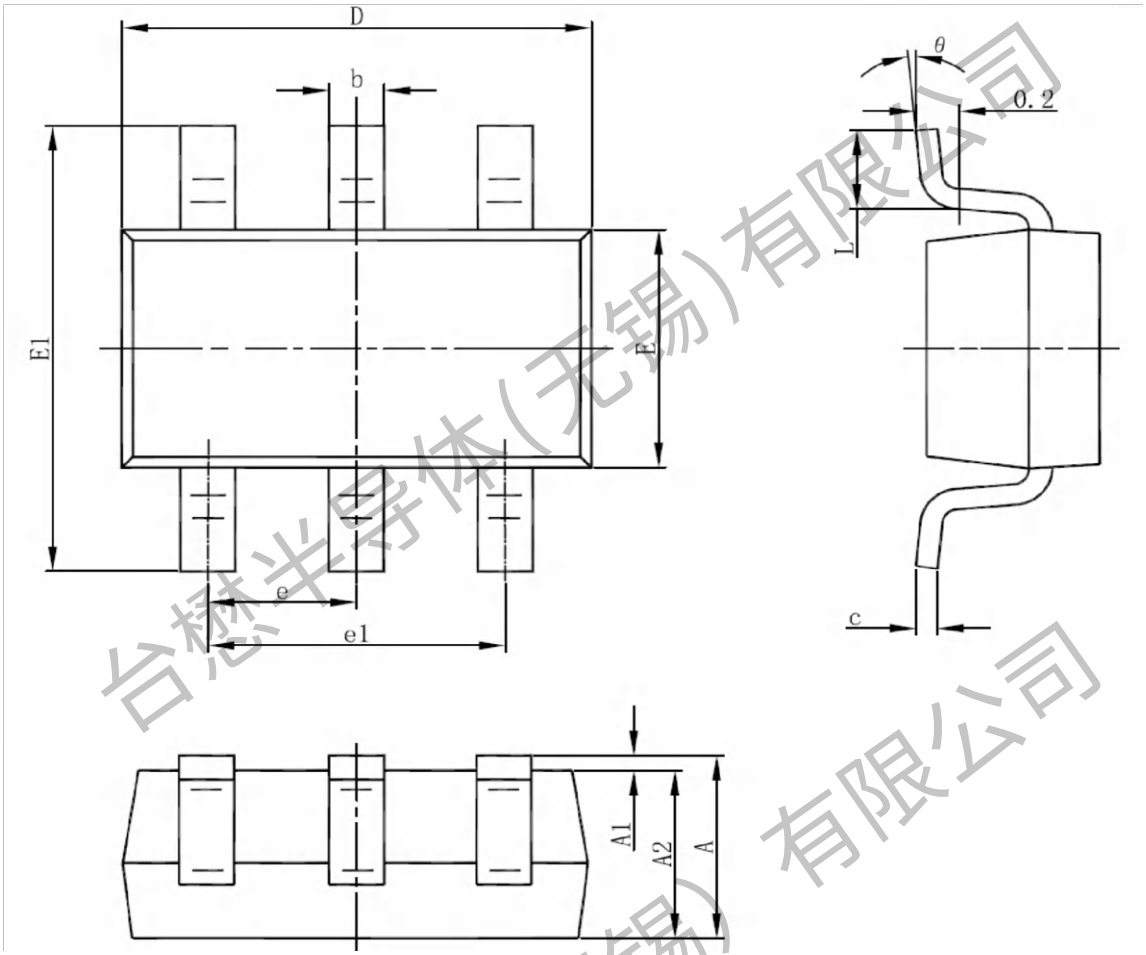
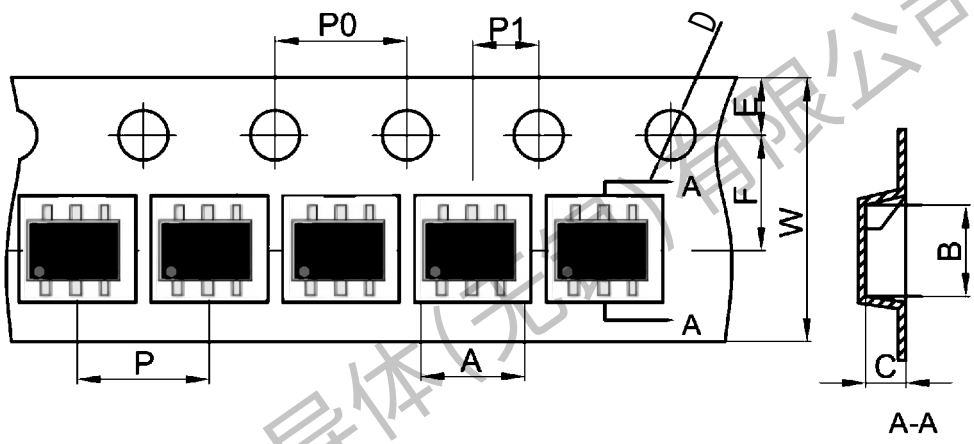
Package Mechanical Data:SOT-23-6L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

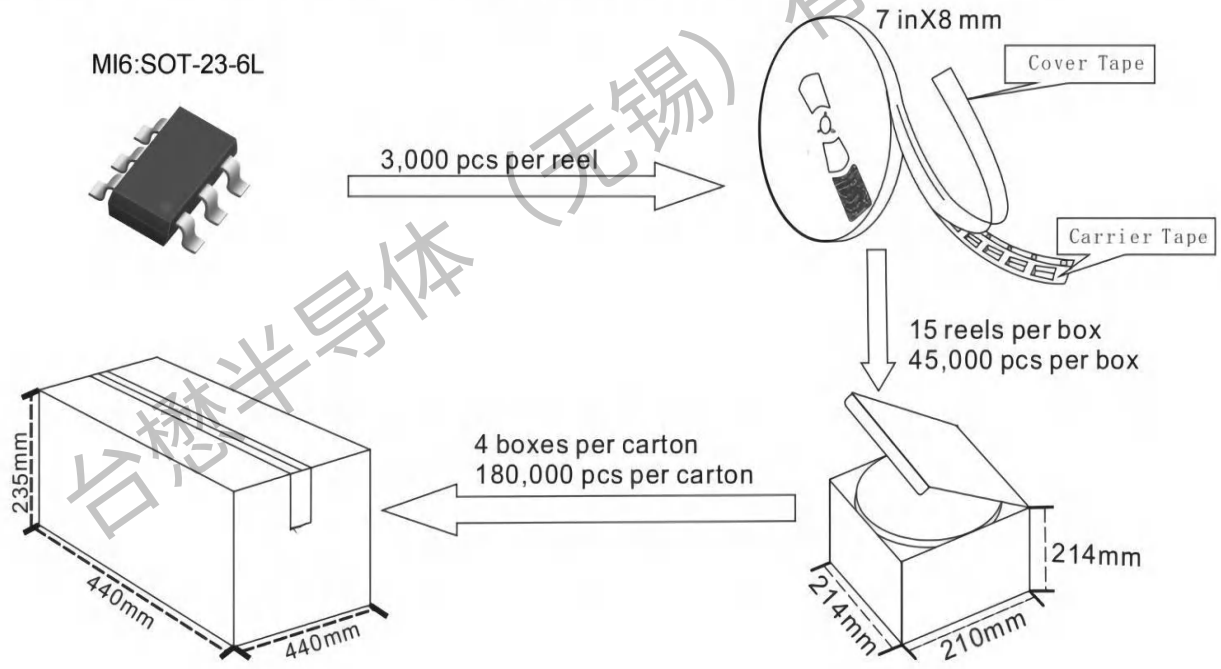
SOT-23-6L Embossed Carrier Tape



Dimensions are in millimeter										
Pkg type	A	B	C	D	E	F	P0	P	P1	W
SOT-23-6L	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

SOT-23-6L Packing

The method of packaging and dimension are shown as below figure. (Dimension in mm)



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Revision history:

Date	Rev	Description	Page
2023.06.22	23.06	Original	