P-Channel Enhancement Mode Power MOSFET

DESCRIPTION

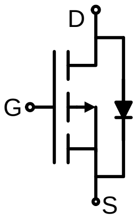
The JRM4407 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V.

GENERAL FEATURES

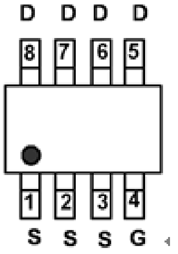
- V_{DS} = -30V,I_D = -12A
  $R_{DS(ON)}$ < 25mΩ @ V_{GS}=-4.5V
  $R_{DS(ON)}$ < 15mΩ @ V_{GS}=-10V
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

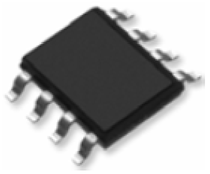
- Battery Switch
- Load Switch
- Power Management



Schematic diagram



Marking and pin Assignment



SOP-8 top view

Package Marking And Ordering Information

Device Marking	Ordering Codes	Package	Product Code	Packing
M4407	JRM4407	SOP-8	JRM4407	Reel

Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	-12	A
Drain Current-Pulsed (Note 1)	I_{DM}	-48	A
Maximum Power Dissipation(Tc=25℃)	P_D	3	W
Maximum Power Dissipation(Tc=100℃)		1.3	
Single pulse avalanche energy (Note 2)	E_{AS}	171	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient	$R_{\theta JA}$	41	℃/W

Electrical Characteristics (TA=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-30	-33	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-30V,V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1	-1.5	-3	V
Drain-Source On-State Resistance (Note 3)	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-6A	-	11.5	15	mΩ
		V_{GS}=-4.5V, I_D=-6A	-	18	25	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-10V,I_D=-12A	16	-	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=-15V,V_{GS}=0V, F=1.0MHz	-	2628	-	PF
Output Capacitance	C_{oss}		-	294	-	PF
Reverse Transfer Capacitance	C_{rss}		-	271	-	PF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-15V, ID=-12A, V_{GS}=-10V,R_{GEN}=1Ω	-	9	-	nS
Turn-on Rise Time	t_r		-	8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	28	-	nS
Turn-Off Fall Time	t_f			10	-	nS
Total Gate Charge	Q_g	V_{DS}=-15V,I_D=-12A V_{GS}=-10V	-	55.3	-	nC
Gate-Source Charge	Q_{gs}		-	7.9	-	nC
Gate-Drain Charge	Q_{gd}		-	11.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-12A	-	-	-1.2	V

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. I_{AS} = -34A, V_{DD} = -30V, R_G = 25Ω, Starting T_j= 25°C.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

Characteristics Curves

Figure 1 Output Characteristics

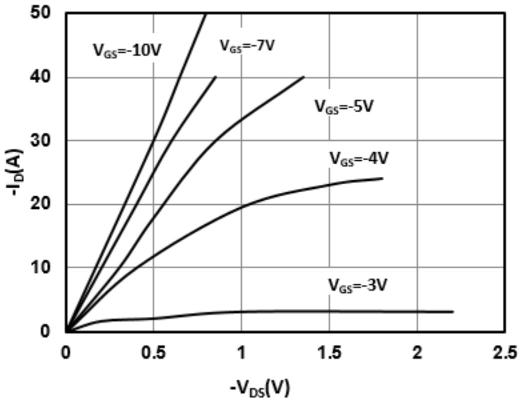


Figure 2 Transfer Characteristics

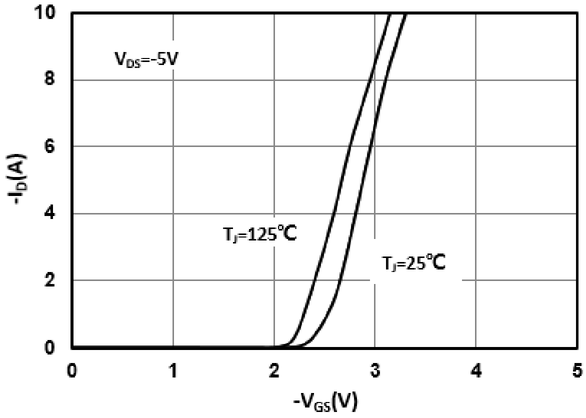


Figure 3 On-Resistance vs. I_D and V_{GS}

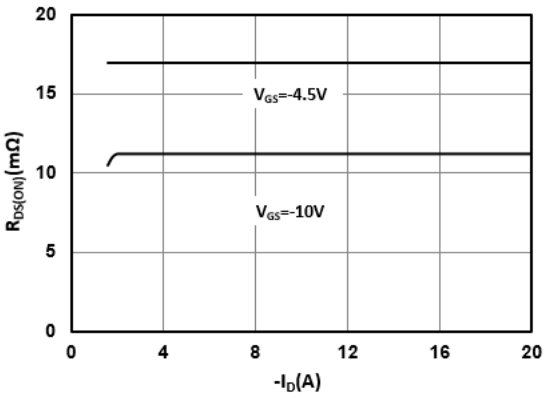


Figure 4 On-Resistance vs. Junction Temperature

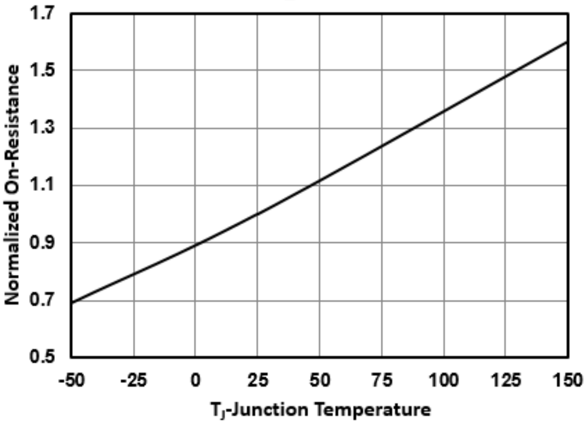


Figure 5 On-Resistance vs. V_{GS}

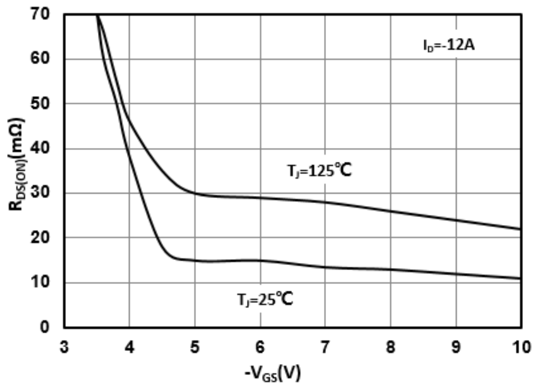


Figure 6 Body Diode Forward Voltage

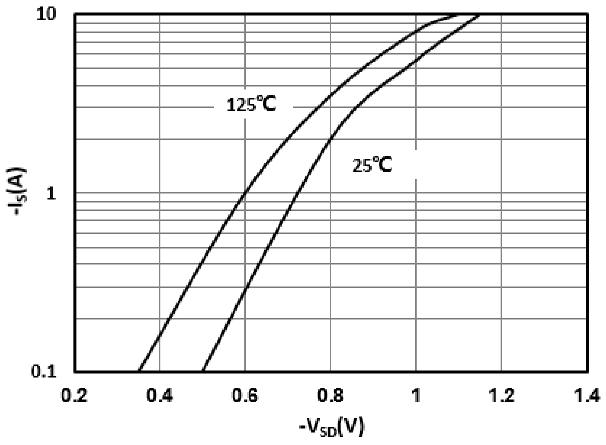


Figure 7 Gate-Charge Characteristics

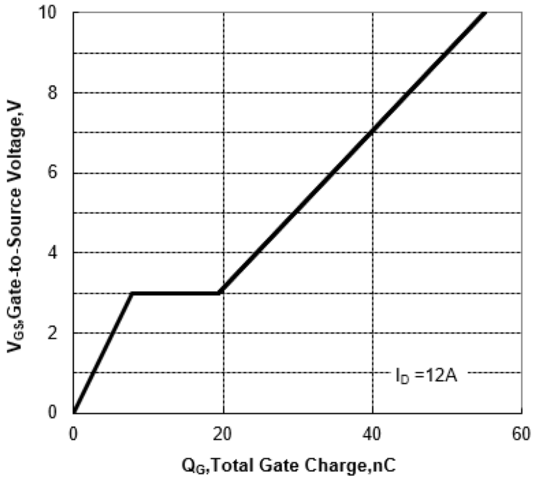


Figure 8 Capacitance Characteristics

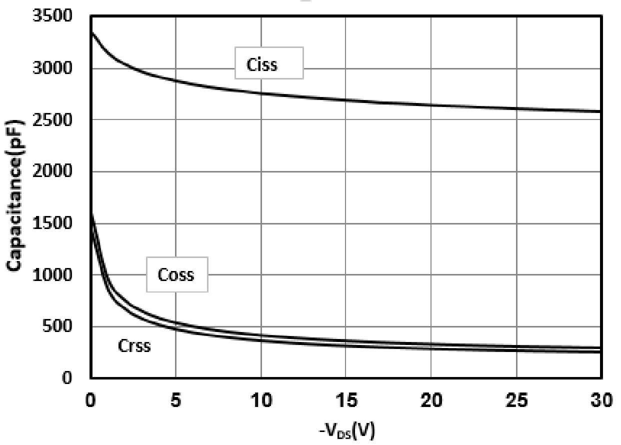


Figure 9 Safe Operation Area

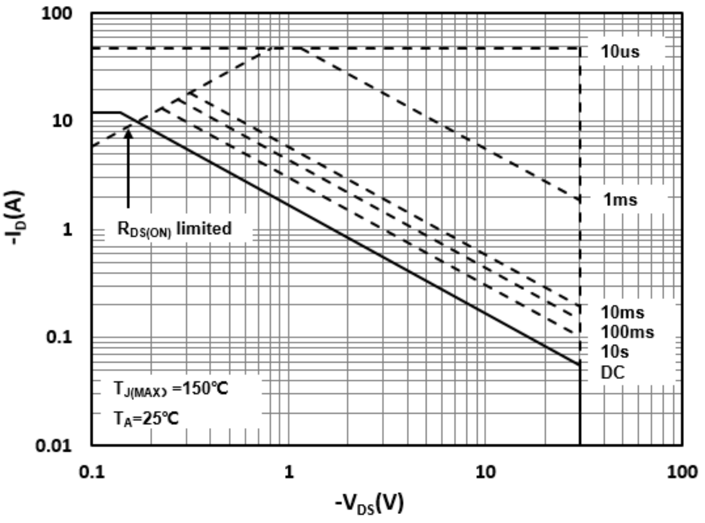
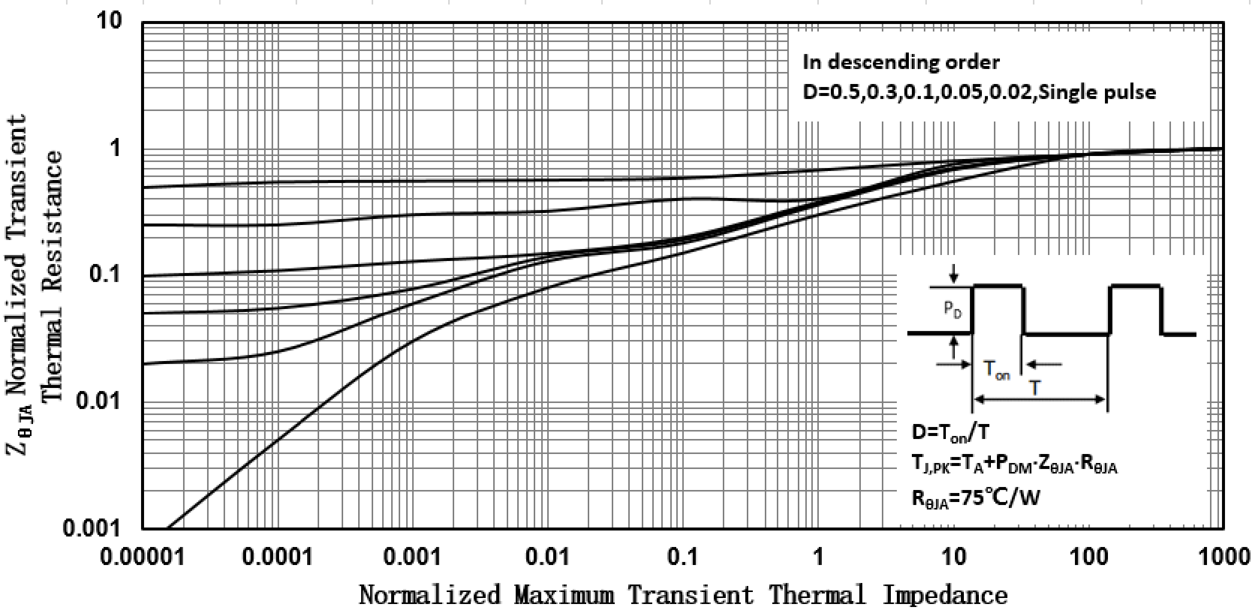


Figure 10 Transient Thermal Impedance



Test Circuit and Waveform

Figure A: Gate Charge Test Circuit and Waveform

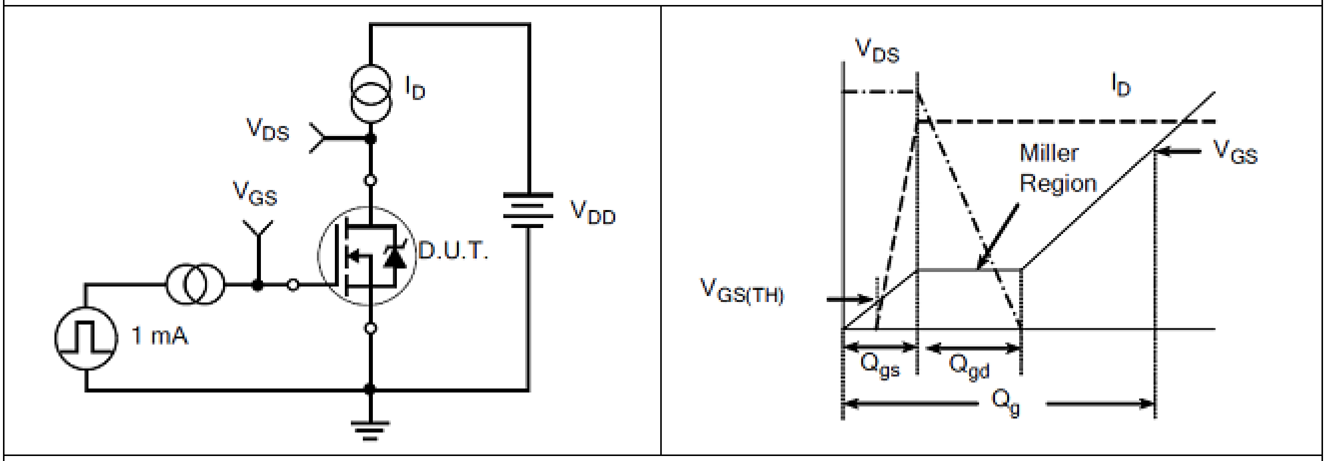


Figure B: Resistive Switching Test Circuit and Waveform

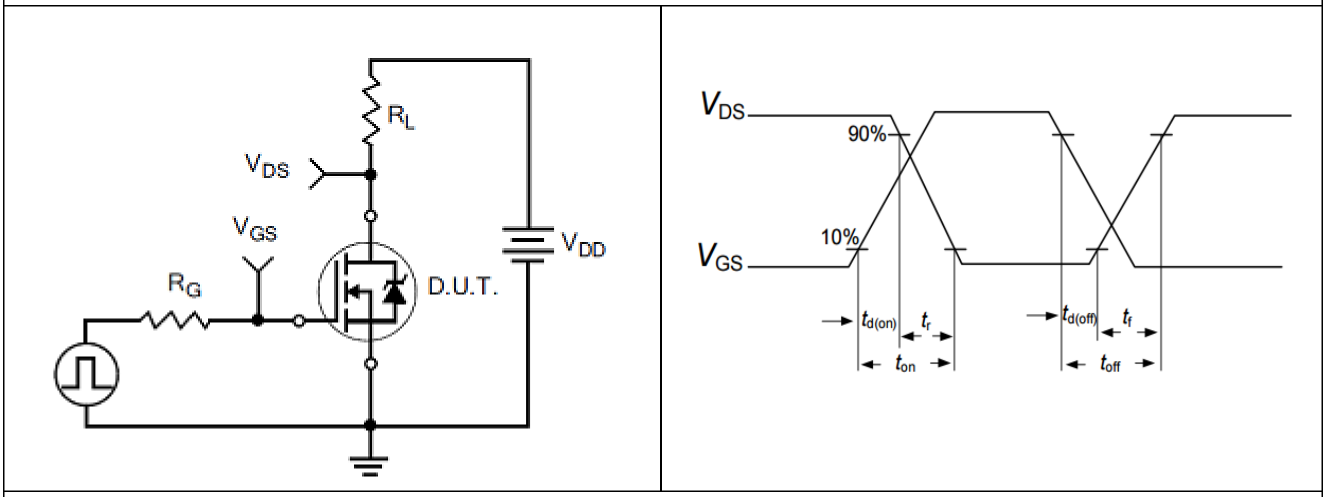
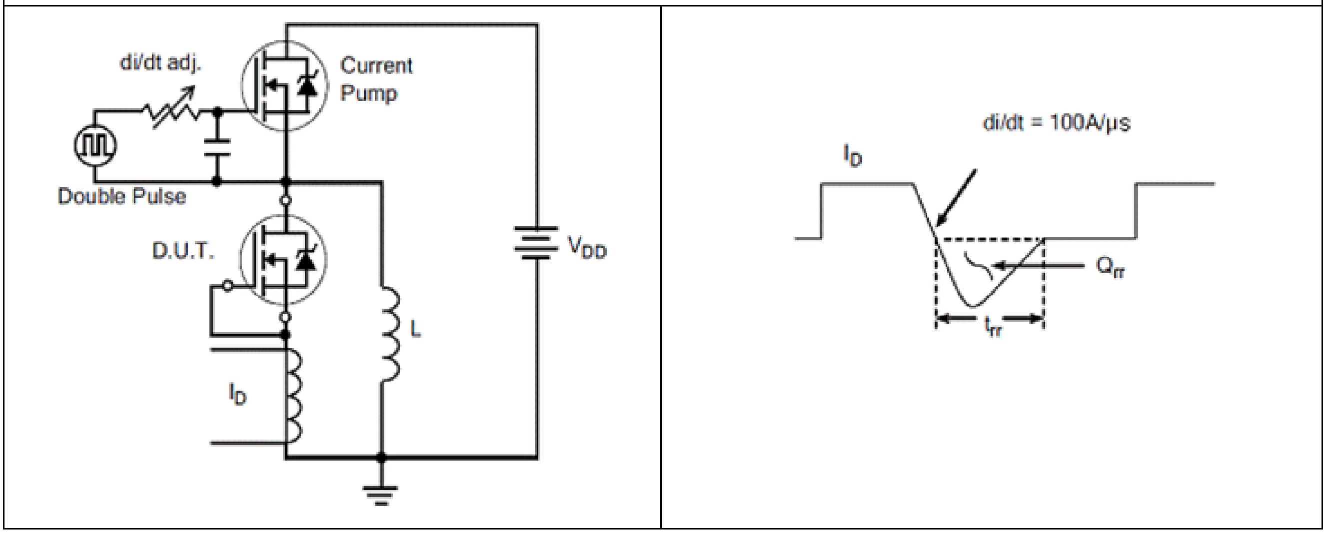
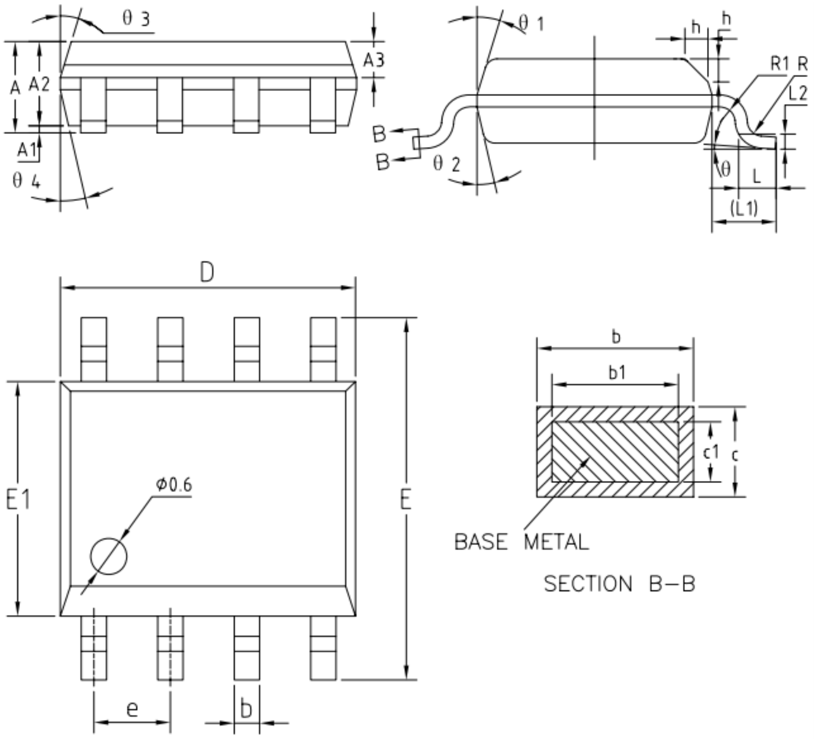


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



SOP-8 PACKAGE IN FORMATION



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	–	0.51
b1	0.37	0.42	0.47
c	0.18	–	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.17	1.27	1.37
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	–	–
R1	0.07	–	–
h	0.30	0.40	0.50
θ	0°	–	8°
θ 1	15°	17°	19°
θ 2	11°	13°	15°
θ 3	15°	17°	19°
θ 4	11°	13°	15°

NOTE:

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. MOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. Shanghai Jerrett reserves the right to make changes in this specification sheet and is subject to change without prior notice.