

• General Description

The ZMC88404D combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. It combines one N channel MOSFET and one P channel MOSFET.

• Features

- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Dual DIE in one package

• Application

- Power Management in Notebook Computer
- BLDC Motor driver

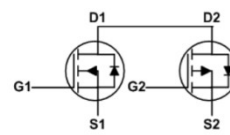
• Ordering Information:

Part NO.	ZMC88404D
Marking	ZMC88404
Packing Information	REEL TAPE
Basic ordering unit (pcs)	2500

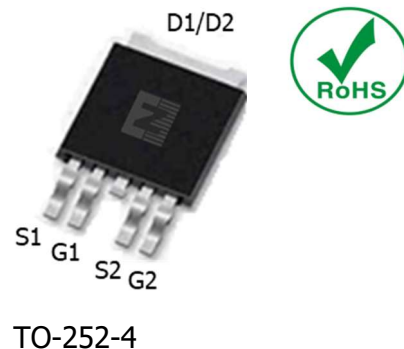
• N Channel Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current($T_C=25^\circ\text{C}$)	I_D	25	A
Pulsed Drain Current ^①	I_{DM}	60	A
Total Power Dissipation($T_C=25^\circ\text{C}$)	$P_D@T_C=25^\circ\text{C}$	50	W
Total Power Dissipation($T_A=25^\circ\text{C}$)	$P_D@T_A=25^\circ\text{C}$	2.0	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 to 150	$^\circ\text{C}$
Single Pulse Avalanche Energy	E_{AS}	35	mJ

• Product Summary



$V_{DS1} = 40\text{V}$
 $V_{DS2} = -40\text{V}$
 $R_{DS(ON)1} = 19\text{m}\Omega$
 $R_{DS(ON)2} = 29\text{m}\Omega$
 $I_{D1} = 25\text{A}$
 $I_{D2} = -20\text{A}$



•P Channel Absolute Maximum Ratings (T_c =25°C)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V _{DS}	-40	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current(TC=25°C)	I _D	-20	A
Pulsed Drain Current ^①	I _{DM}	-40	A
Total Power Dissipation	P _D @TC=25°C	50	W
Total Power Dissipation	P _D @TA=25°C	2.0	W
Operating Junction Temperature	T _J	-55 to 150	°C
Storage Temperature	T _{STG}	-55 to 150	°C
Single Pulse Avalanche Energy	E _{AS}	35	mJ

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R _{thJC}	-	-	2.1	° C/W
Thermal resistance, junction - ambient	R _{thJA}	-	-	62.5	° C/W
Soldering temperature, wavesoldering for 10s	T _{sold}	-	-	265	° C

•N Channel Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	40			V
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	1.2	1.6	2.5	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V			1.0	uA
Gate- Source Leakage Current	I _{GSS}	V _{GS} =±20V ,V _{DS} =0V			±100	nA
Static Drain-source On Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =6A		19	24	mΩ
		V _{GS} =4.5V, I _D =4A		28	36	mΩ
Forward Transconductance	g _{FS}	V _{DS} =25V, I _D =5A		2		s

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C _{iss}	f = 1MHz V _{DS} =25V	-	850	-	pF
Output capacitance	C _{oss}		-	190	-	
Reverse transfer capacitance	C _{rss}		-	100	-	

•Gate Charge characteristics($T_a = 25^{\circ}\text{C}$)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Qg	$V_{DD} = 25\text{V}$ $I_D = 6\text{A}$ $V_{GS} = 10\text{V}$	-	10	-	nC
Gate - Source charge	Qgs		-	4	-	
Gate - Drain charge	Qgd		-	6	-	

•P Channel Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$	-40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\mu\text{A}$	-1.2		-2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = -40\text{V}, V_{GS} = 0\text{V}$			-1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS} = -10\text{V}, I_D = -4\text{A}$		29	36	$\text{m}\Omega$
		$V_{GS} = -4.5\text{V}, I_D = -3\text{A}$		38	49	$\text{m}\Omega$
Forward Transconductance	g_{FS}	$V_{DS} = -10\text{V}, I_D = -4\text{A}$			1.2	s

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$f = 1\text{MHz}$ $V_{DS} = -25\text{V}$	-	1250	-	pF
Output capacitance	C_{oss}		-	300	-	
Reverse transfer capacitance	C_{rss}		-	215	-	

•Gate Charge characteristics($T_a = 25^{\circ}\text{C}$)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Qg	$V_{DD} = -25\text{V}$ $I_D = -8\text{A}$ $V_{GS} = -10\text{V}$	-	16	-	nC
Gate - Source charge	Qgs		-	6	-	
Gate - Drain charge	Qgd		-	8	-	

•N Channel characteristics curve

Fig.1 Power Dissipation Derating Curve

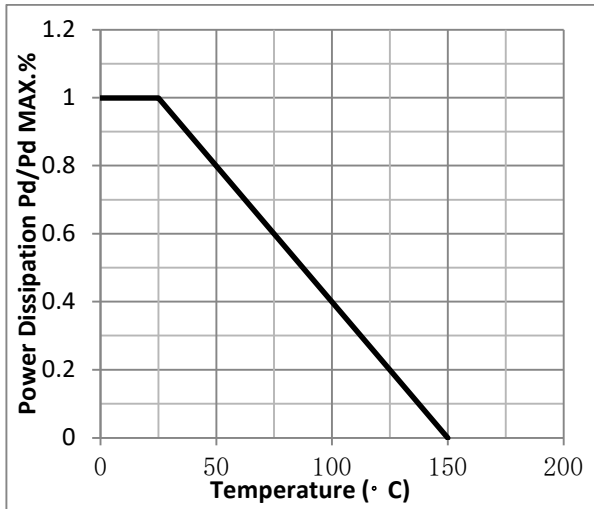


Fig.2 Typical output Characteristics

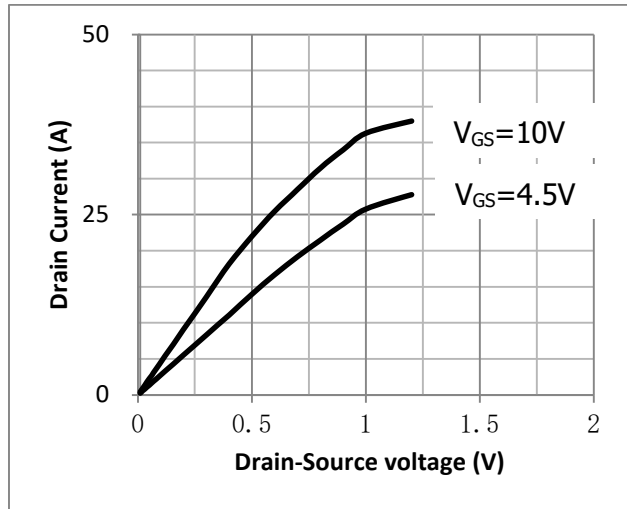


Fig.3 Threshold Voltage V.S Junction Temperature

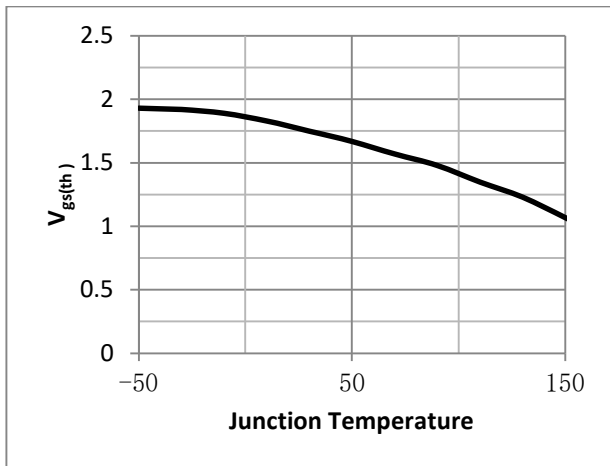


Fig.4 Resistance V.S Drain Current

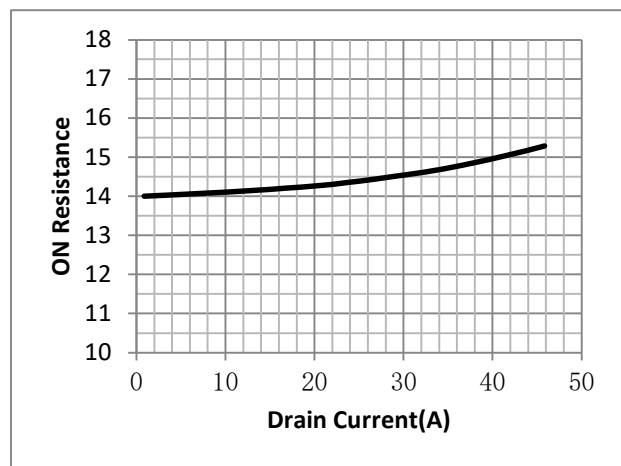


Fig.5 On-Resistance VS Gate Source Voltage

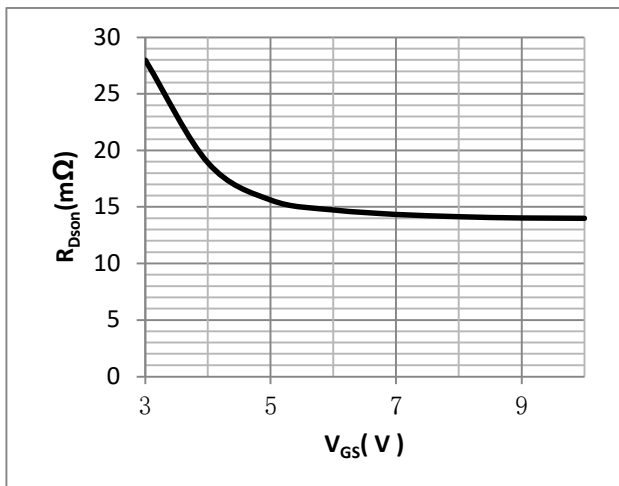
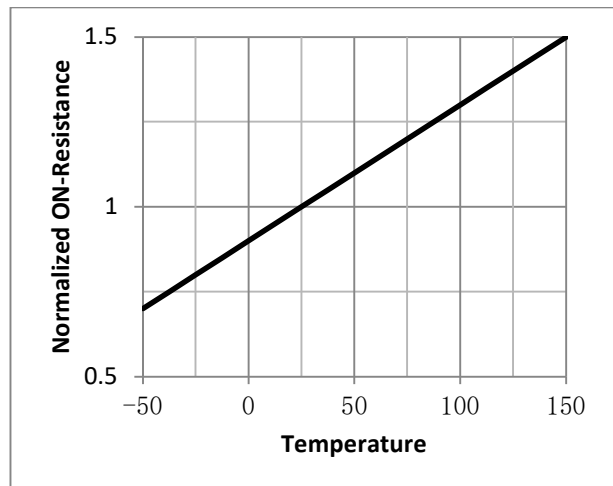


Fig.6 On-Resistance V.S Junction Temperature



•P Channel characteristics curve

Fig.1 Power Dissipation Derating Curve

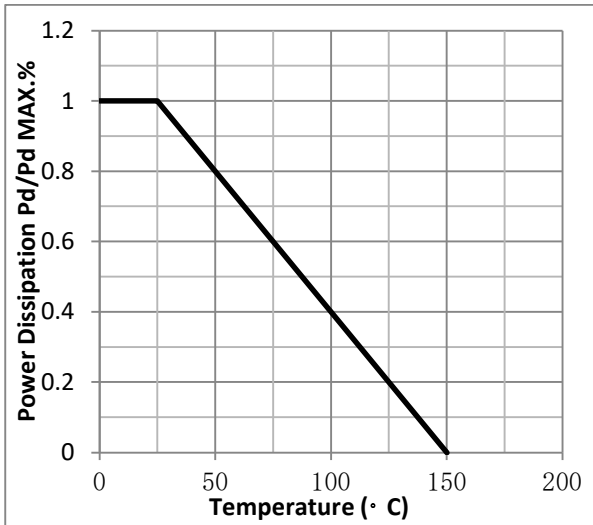


Fig.2 Typical output Characteristics

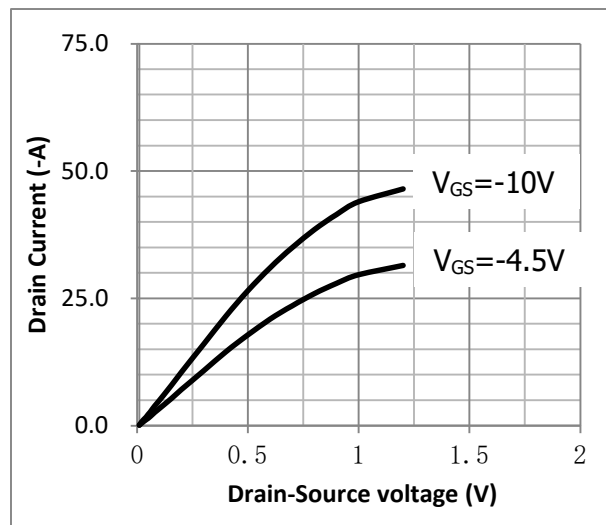


Fig.3 Threshold Voltage V.S Junction Temperature

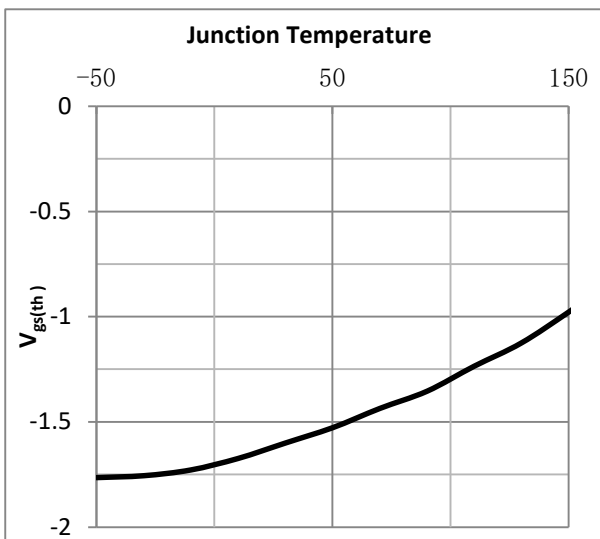


Fig.4 Resistance V.S Drain Current

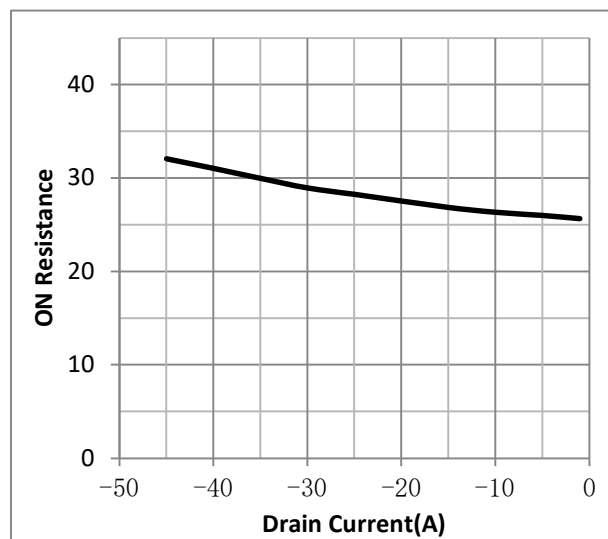


Fig.5 On-Resistance VS Gate Source Voltage

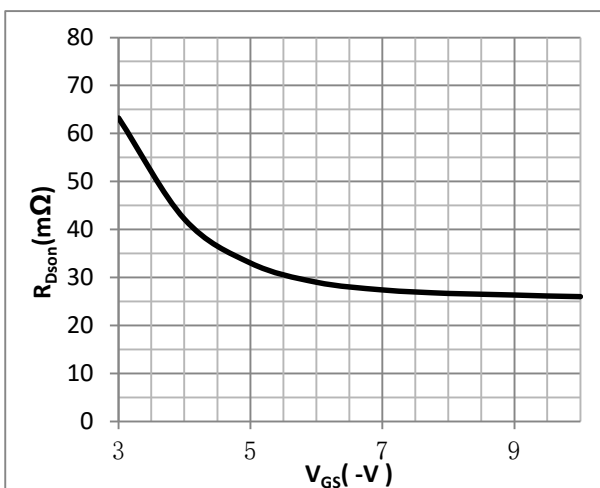
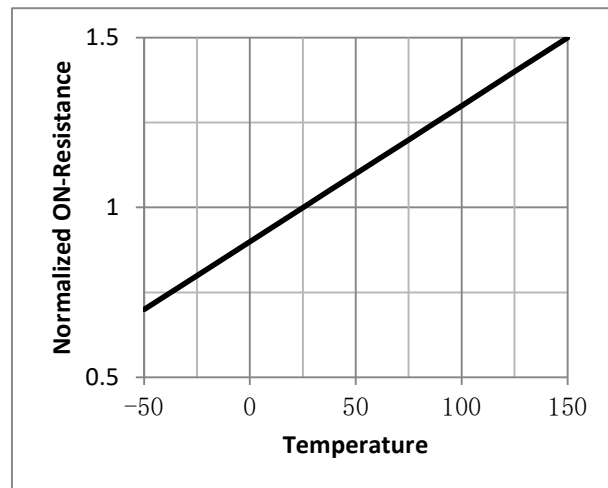


Fig.6 On-Resistance V.S Junction Temperature



•Test Circuit

Fig.1 Gate Charge Measurement Circuit

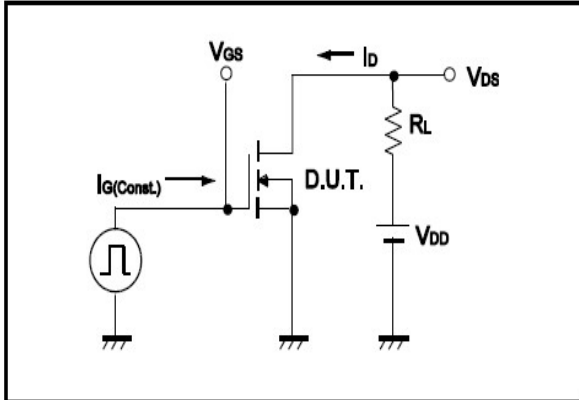


Fig.2 Gate Charge Waveform

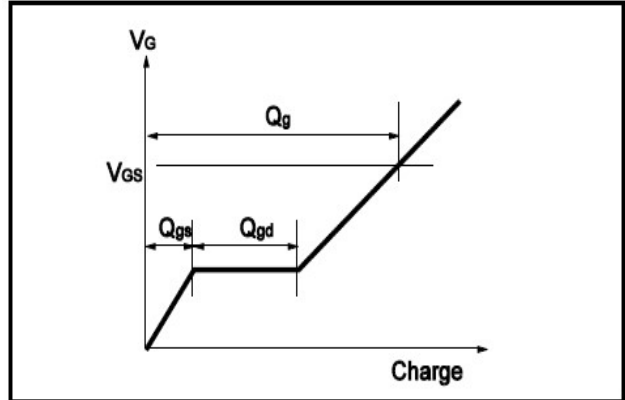


Fig.3 Switching Time Measurement Circuit

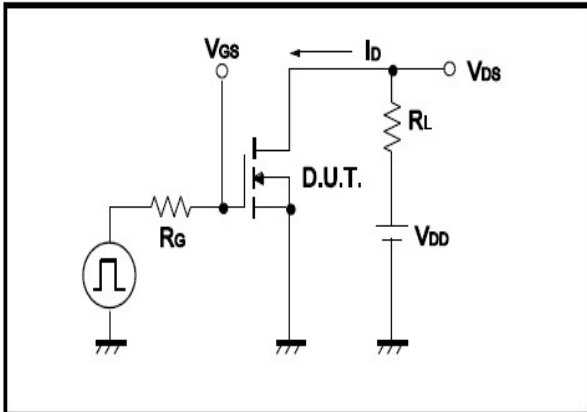


Fig.4 Switching Time Waveform

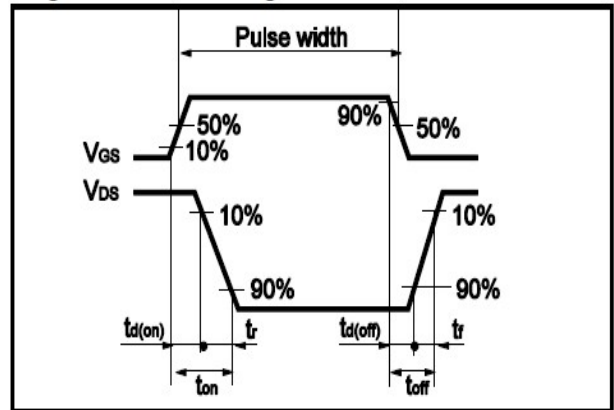


Fig.5 Avalanche Measurement Circuit

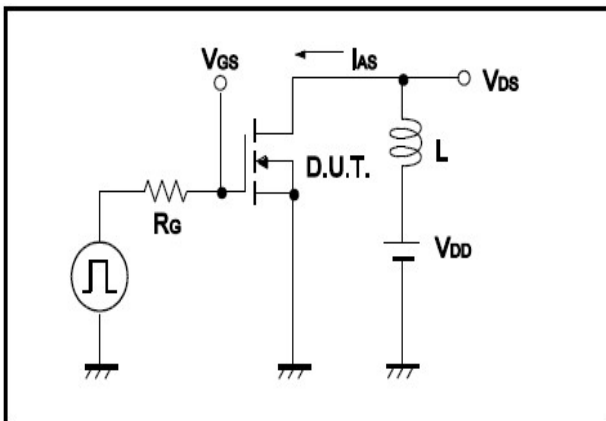
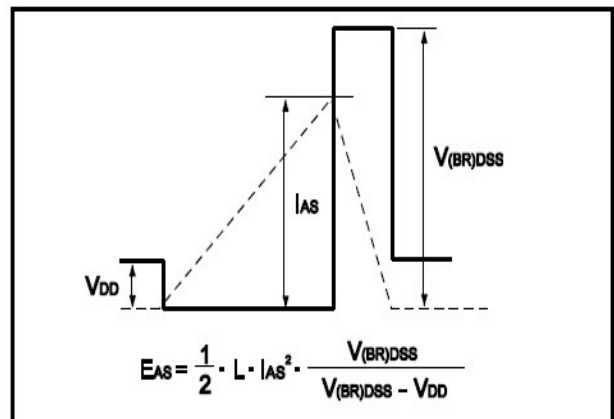


Fig.6 Avalanche Waveform





●Dimensions(TO-252-4)

Unit: mm

