

• General Description

The ZMC88403S 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

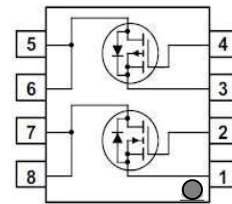
• Ordering Information:

Part NO.	ZMC88403S
Marking	ZMC88403
Packing Information	REEL TAPE
Basic ordering unit (pcs)	4000

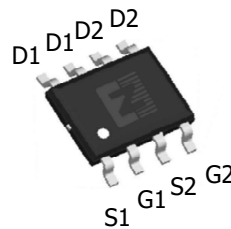
• N Channel Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$)

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	9	A
Pulsed Drain Current ^①	I_{DM}	18	A
Total Power Dissipation($T_C=25^\circ\text{C}$)	$P_D@T_C=25^\circ\text{C}$	2.2	W
Total Power Dissipation($T_A=25^\circ\text{C}$)	$P_D@T_A=25^\circ\text{C}$	0.69	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



$V_{DS1} = 40\text{V}$
 $V_{DS2} = -40\text{V}$
 $R_{DS(ON)1} = 14\text{m}\Omega$
 $R_{DS(ON)2} = 29\text{m}\Omega$
 $I_{D1} = 9\text{A}$
 $I_{D2} = -5\text{A}$



SOP8



•P 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	-5	A
Pulsed Drain Current ^①	I_{DM}	-10	A
Total Power Dissipation	$P_D@T_C=25^\circ\text{C}$	2.2	W
Total Power Dissipation	$P_D@T_A=25^\circ\text{C}$	0.69	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

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	56	$^\circ\text{C/W}$
Thermal resistance, junction - ambient	R_{thJA}	-	-	180	$^\circ\text{C/W}$
Soldering temperature, wavesoldering for 10s	T_{sold}	-	-	265	$^\circ\text{C}$

•N Channel Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	1.2	1.6	2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 40V, V_{GS} = 0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 6A$		14	18	$m\Omega$
		$V_{GS} = 4.5V, I_D = 4A$		18	24	$m\Omega$
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 $V_{DS} = 25V$	-	1150	-	pF
Output capacitance	C_{oss}		-	290	-	
Reverse transfer capacitance	C_{rss}		-	205	-	

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

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

•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

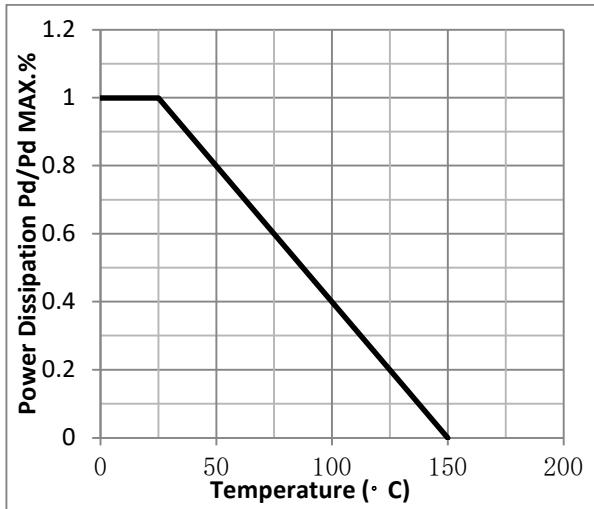


Fig.2 Typical output Characteristics

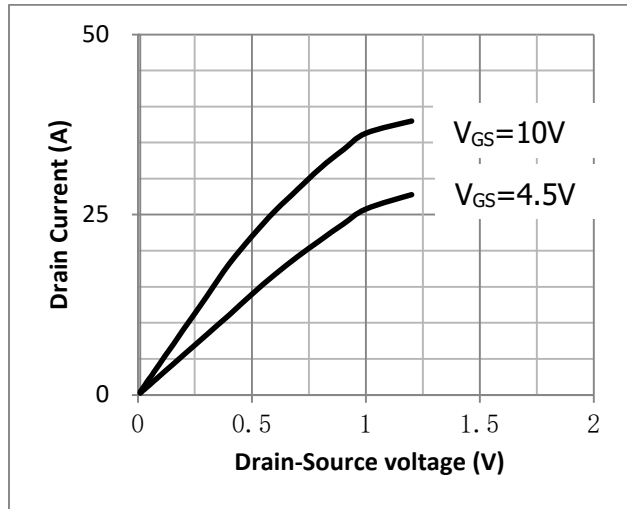


Fig.3 Threshold Voltage V.S Junction Temperature

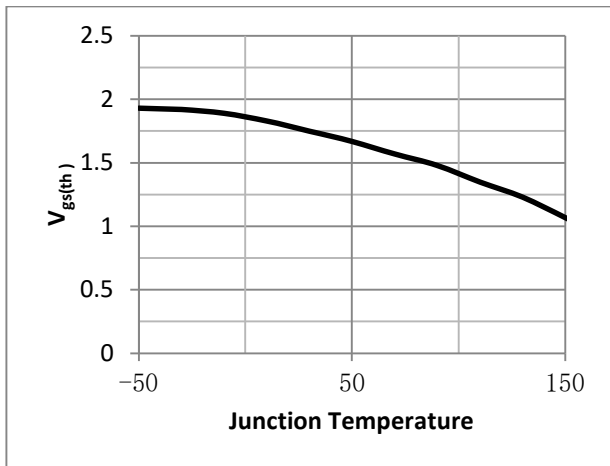


Fig.4 Resistance V.S Drain Current

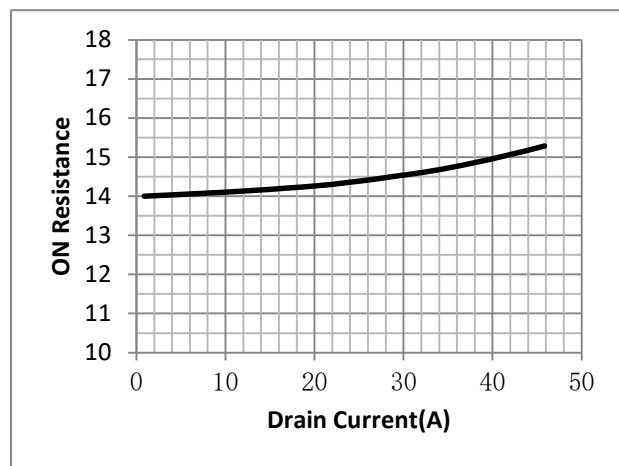


Fig.5 On-Resistance VS Gate Source Voltage

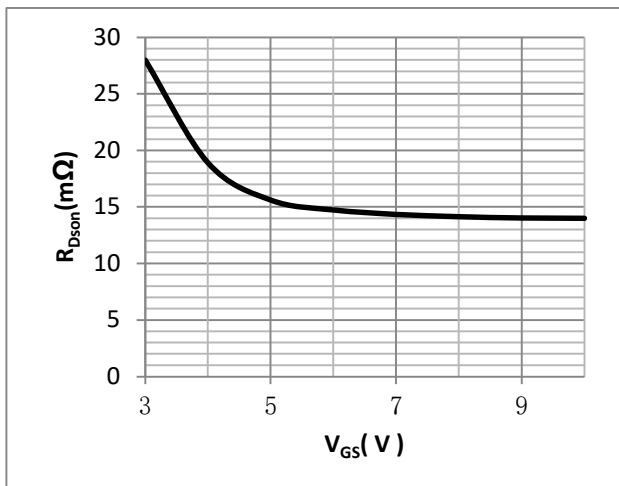
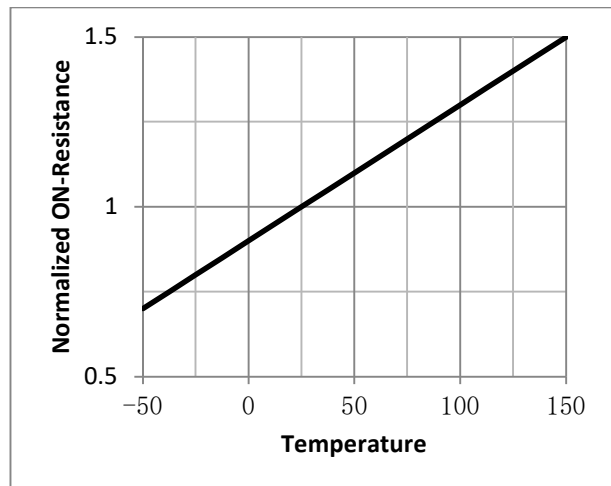


Fig.6 On-Resistance V.S Junction Temperature



•P Channel characteristics curve

Fig.1 Power Dissipation Derating Curve

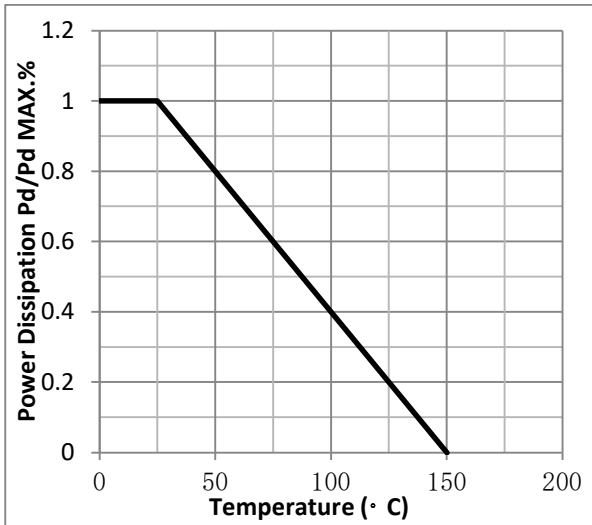


Fig.2 Typical output Characteristics

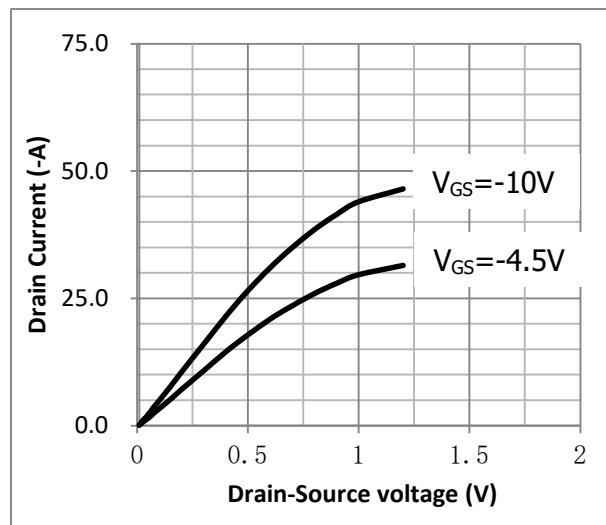


Fig.3 Threshold Voltage V.S Junction Temperature

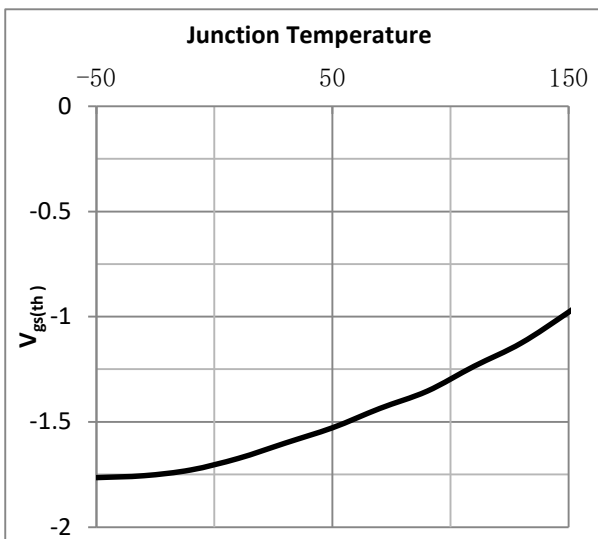


Fig.4 Resistance V.S Drain Current

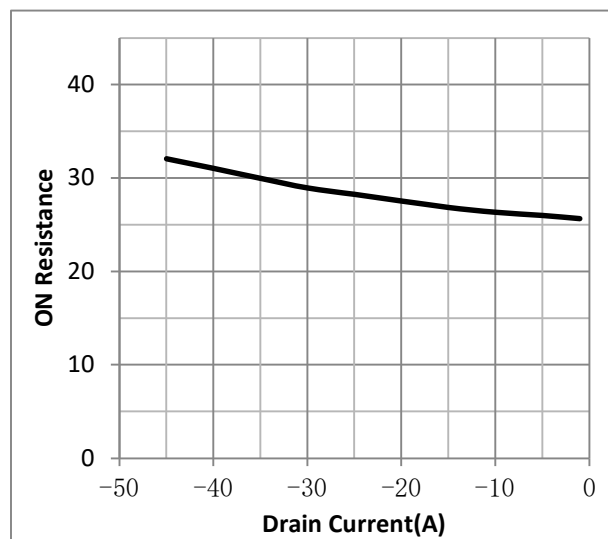


Fig.5 On-Resistance VS Gate Source Voltage

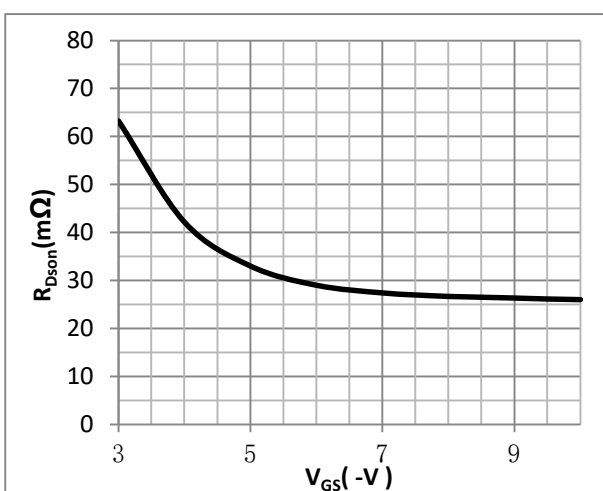
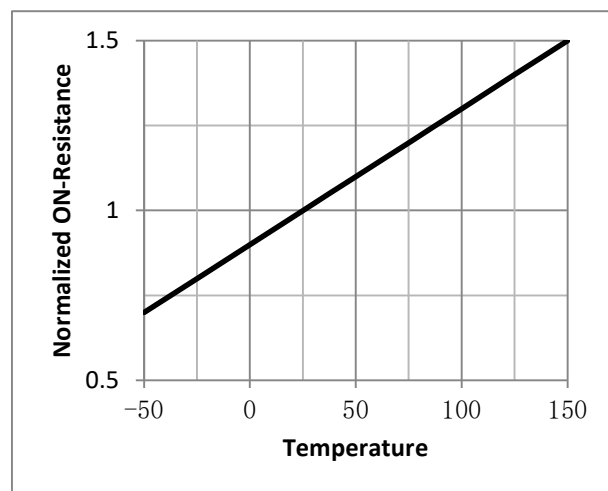


Fig.6 On-Resistance V.S Junction Temperature



A graph showing the relationship between Gate Voltage (V_G) and Charge. The curve consists of three segments: a linear increase from the origin to a plateau at voltage V_{GS} (labeled Q_{gs}), a constant voltage plateau (labeled Q_{gd}), and a linear increase from the plateau (labeled Q_g). The total charge up to the end of the plateau is $Q_{gs} + Q_{gd}$.

The diagram shows a trapezoidal signal waveform. The peak voltage is labeled V_{DD} . The voltage during the flat-top portion is labeled $V_{(BR)DSS}$. The current during the linear ramp-up and ramp-down portions is labeled I_{AS} . The waveform is used to illustrate the calculation of average signal energy E_{AS} .

$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AS}^2 \cdot \frac{V_{(BR)DSS}}{V_{(BR)DSS} - V_{DD}}$$

•Dimensions(SOP8)

Unit: mm

SYMBOL	min	TYP	max	SYMBOL	min		max
A	4.80		5.00	C	1.30		1.50
A1	0.37		0.47	C1	0.55		0.75
A2		1.27		C2	0.55		0.65
A3		0.41		C3	0.05		0.20
B	5.80		6.20	C4	0.19	0.20	0.23
B1	3.80		4.00	D		1.05	
B2		5.00		D1	0.40		0.62

