● General Description

The ZM390P04S combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

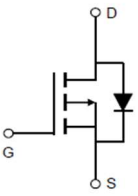
● Features

- ■ Advance high cell density Trench technology
- ■Low $R_{DS(ON)}$ to minimize conductive loss
- ■Low Gate Charge for fast switching
- ■Low Thermal resistance

●Application

- ■SMPS 2nd Synchronous Rectifier
- ■BLDC Motor driver

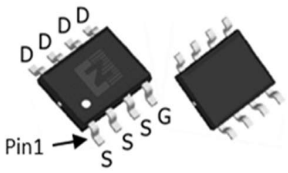
● Product Summary



V_{DS}=-40V

$R_{DS(ON)}$ =45mΩ

I_D =-6A



SOP-8

●Ordering Information:

Part NO.	ZM390P04S
Marking	ZM390P04
Packing Information	REEL TAPE
Basic ordering unit (pcs)	4000

●Absolute Maximum Ratings (T_C =25℃)

Parameter	**Symbol**	Rating	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current②	I_D@T_C=25℃	-6	A
	I_D@T_C=75℃	-4.6	A
	I_D@T_C=100℃	-3.8	A
Pulsed Drain Current ①	I_{DM}	-36	A
Total Power Dissipation②	P_D@T_C=25℃	3.4	W
Total Power Dissipation	P_D@T_A=25℃	0.69	W
Operating Junction Temperature	T_J	-55 to 150	℃
Storage Temperature	T_{STG}	-55 to 150	℃
Single Pulse Avalanche Energy	E_{AS}	30	mJ

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case②	R_{thJC}	-	-	24	° C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	75	° C/W
Soldering temperature, wavesoldering for 10s	T_{sold}	-	-	265	° C

●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		-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		45	58	mΩ
		V_{GS}=-4.5V, I_D=-5A		70	91	mΩ
Forward Transconductance	g_{FS}	V_{DS} =-10V, I_D=-5A		5		s
Source-drain voltage	V_{SD}	Is=-6A		0.8	1.2	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Resistance	R_G	f = 1MHz		9		Ω
Input capacitance	Ciss	VDS=-25V f = 1MHz	-	750	-	pF
Output capacitance	Coss		-	105	-	
Reverse transfer capacitance	Crss		-	64	-	

●Gate Charge characteristics(Ta= 25℃)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Qg	V_{DD} =-25V I_D = -6A V_{GS} = -10V	-	12	-	nC
Gate - Source charge	Qgs		-	2.4	-	
Gate - Drain charge	Qgd		-	2.8	-	

Note: ① Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2% ;

② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

Fig.1 Power Dissipation Derating Curve

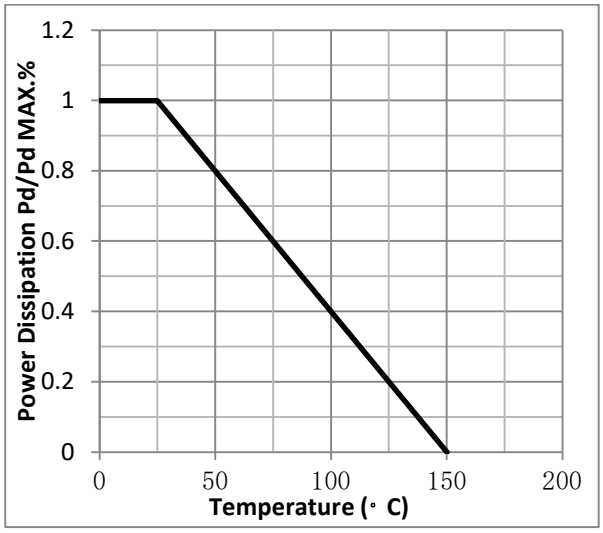


Fig.2 Typical output Characteristics

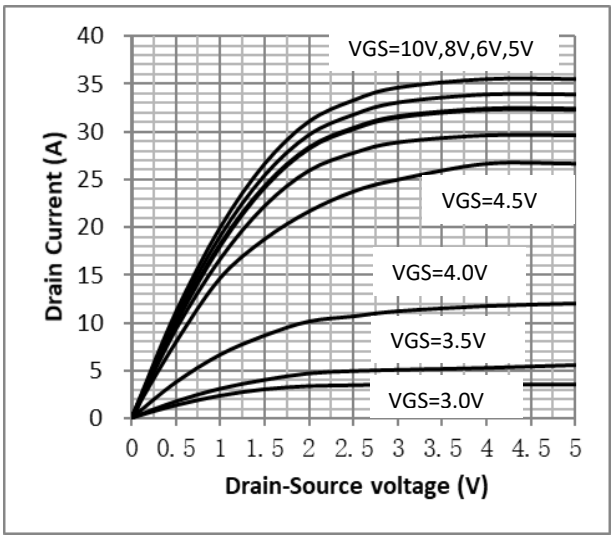


Fig.3 Threshold Voltage V.S Junction Temperature

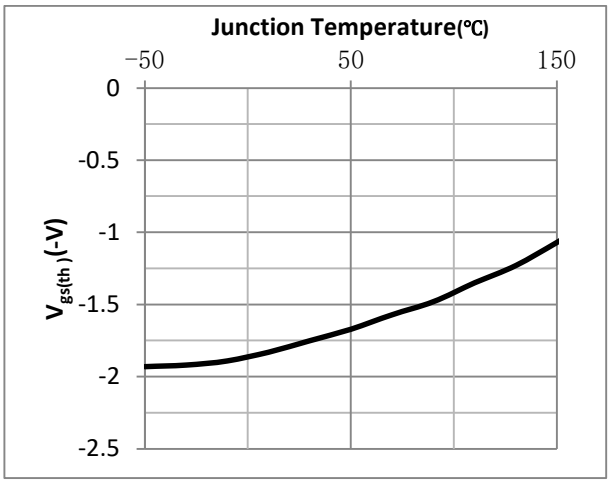


Fig.4 Resistance V.S Drain Current

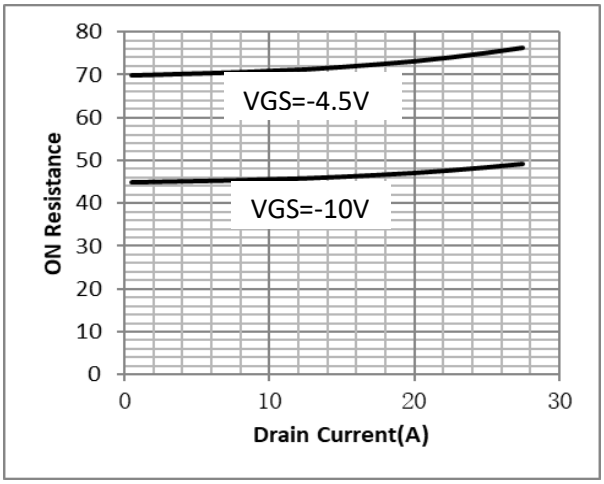


Fig.5 On-Resistance VS Gate Source Voltage

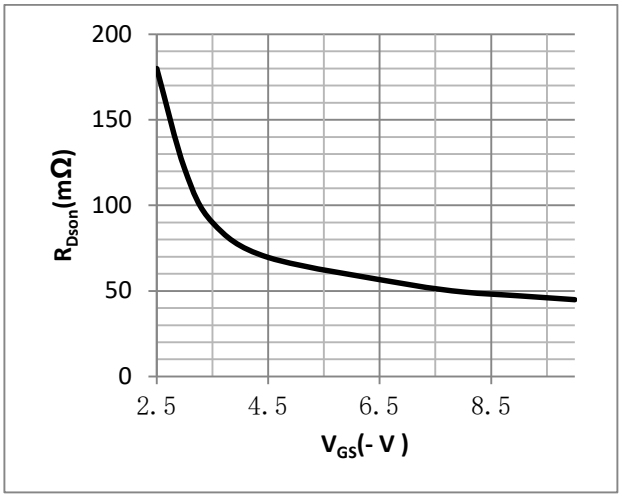


Fig.6 On-Resistance V.S Junction Temperature

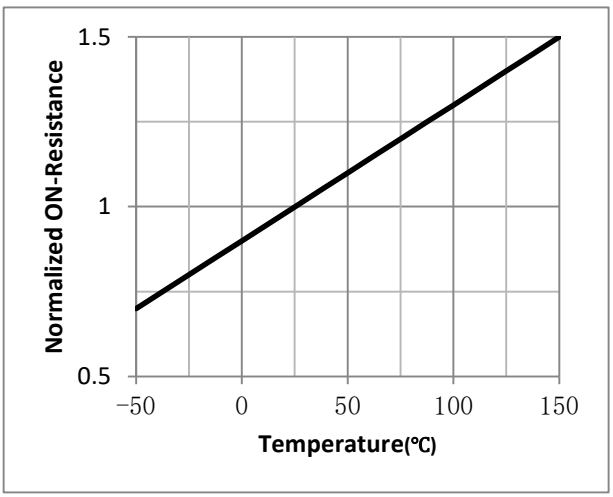


Fig.7 SOA Maximum Safe Operating Area

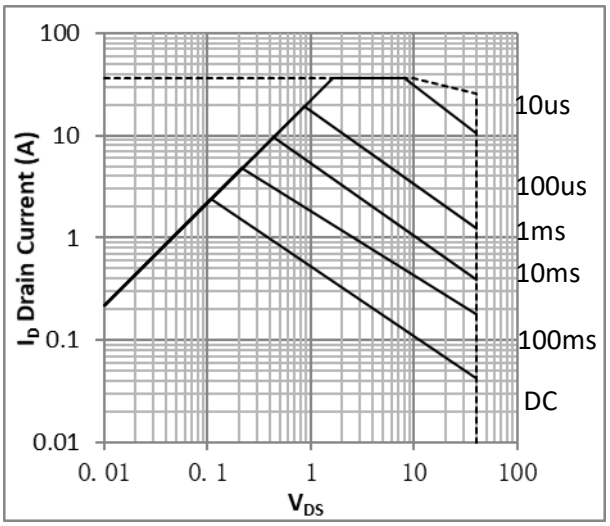


Fig.8 ID-Junction Temperature

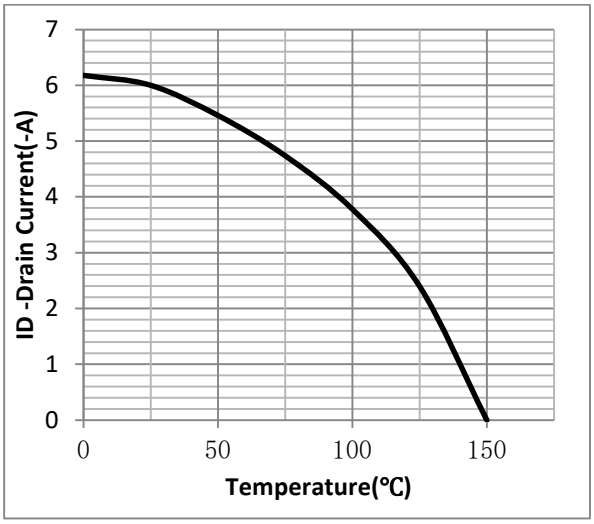


Figure 9. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

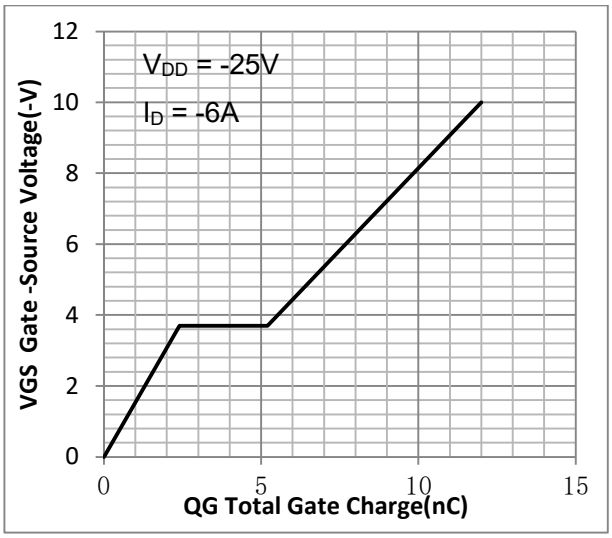


Fig.10 Capacitance Variation

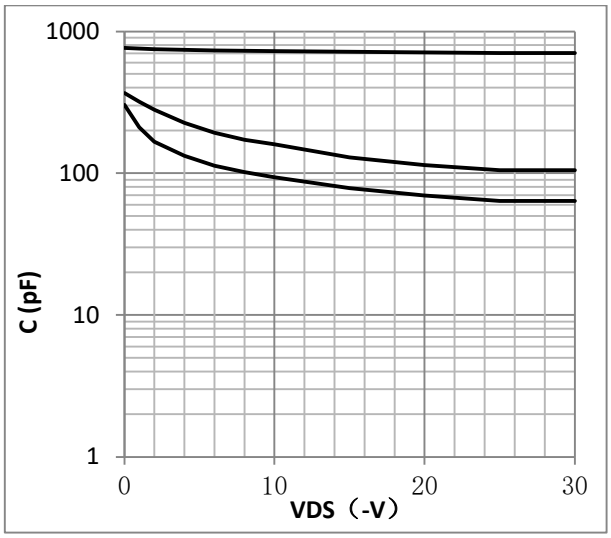


Fig.11 Normalized Maximum Transient Thermal Impedance

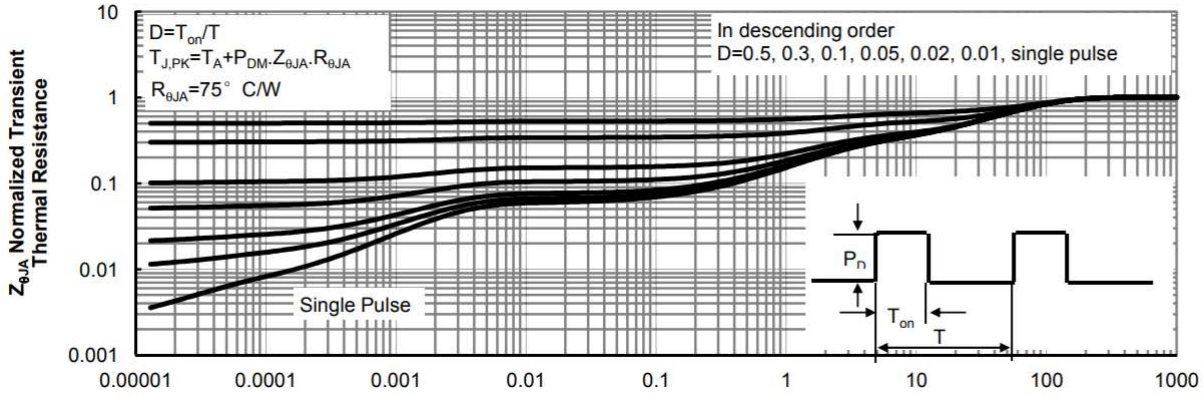


Fig.12 Gate Charge Measurement Circuit

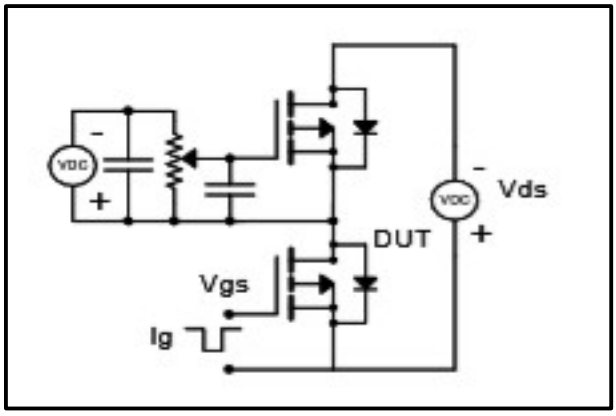


Fig.13 Gate Charge Waveform

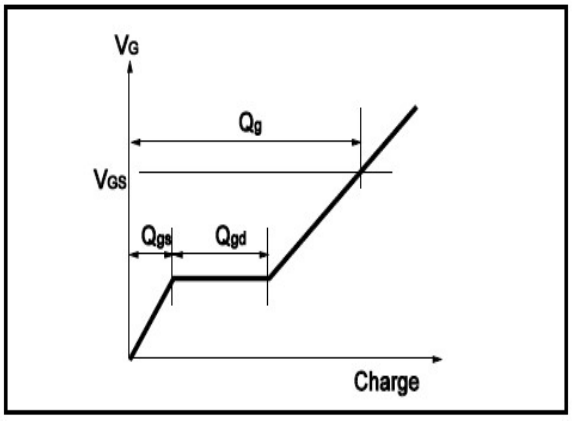


Fig.14 Switching Time Measurement Circuit

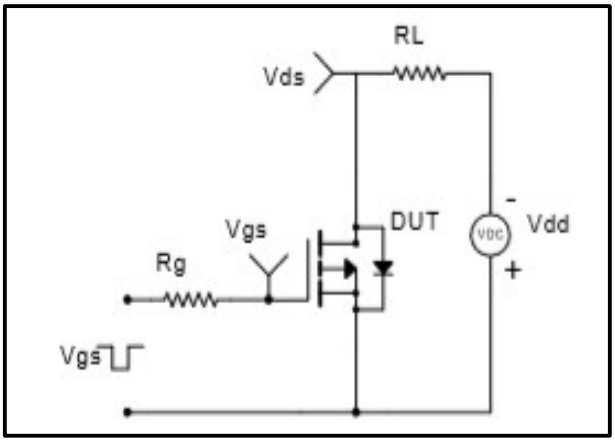


Fig.15 Switching Time Waveform

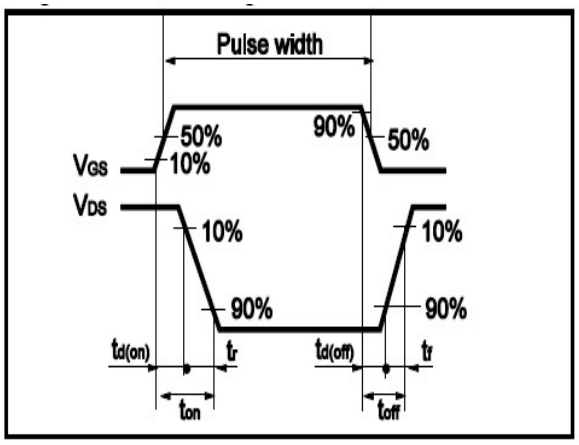


Fig.16 Avalanche Measurement Circuit

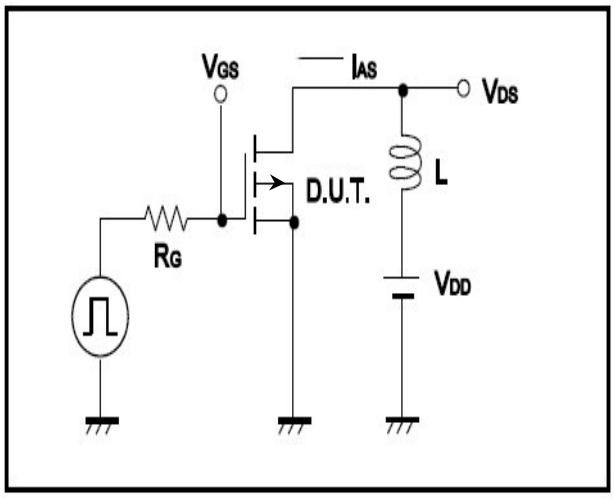
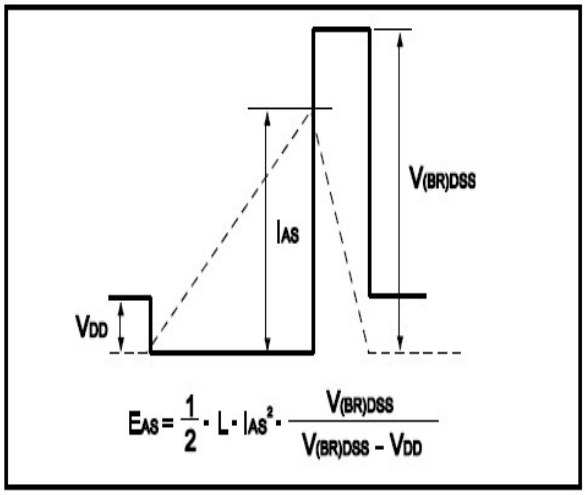


Fig.17 Avalanche Waveform



●Dimensions(SOP8)

Unit: mm

SYMBOL	min	TYP	max	SYMBOL	min		max
A	4.80		5.25	C	1.30		1.75
A1	0.37		0.49	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	0.10	0.20	0.23
B1	3.80		4.10	D		1.05	
B2		5.00		D1	0.40		0.62