

• General Description

It 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.

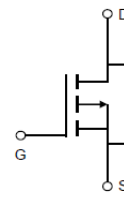
• Features

- 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

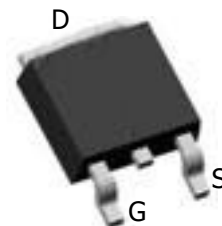
• Product Summary



$$V_{DS} = -40V$$

$$R_{DS(ON)} = 39m\Omega$$

$$I_D = -16A$$



TO-252

• Ordering Information:

Part NO.	ZM390P04D
Marking	ZM390P04
Packing Information	REEL TAPE
Basic ordering unit (pcs)	2500

• Absolute Maximum Ratings ($T_C = 25^\circ C$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^②	$I_D @ TC=25^\circ C$	-16	A
	$I_D @ TC=75^\circ C$	-12	A
	$I_D @ TC=100^\circ C$	-10	A
Pulsed Drain Current ^①	I_{DM}	-48	A
Total Power Dissipation ^②	$P_D @ TC=25^\circ C$	60	W
Total Power Dissipation	$P_D @ TA=25^\circ C$	2.0	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ C$
Storage Temperature	T_{STG}	-55 to 150	$^\circ C$
Single Pulse Avalanche Energy	E_{AS}	30	mJ

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case ^②	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

•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 =-8A		39	50	mΩ
		V _{GS} =-4.5V, I _D =-6A		61	78	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-10V, I _D =-5A		5		s
Source-drain voltage	V _{SD}	I _S =-6A		0.8	1.2	V

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Resistance	R _G	f = 1MHz		9.0		Ω
Input capacitance	C _{iss}		-	838	-	pF
Output capacitance	C _{oss}		-	94	-	
Reverse transfer capacitance	C _{rss}		-	70	-	

•Gate Charge characteristics(Ta= 25°C)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q _g	V _{DD} =-25V	-	15	-	nC
Gate - Source charge	Q _{gs}	I _D = -8A	-	2.3	-	
Gate - Drain charge	Q _{gd}	V _{GS} = -10V	-	3.6	-	

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

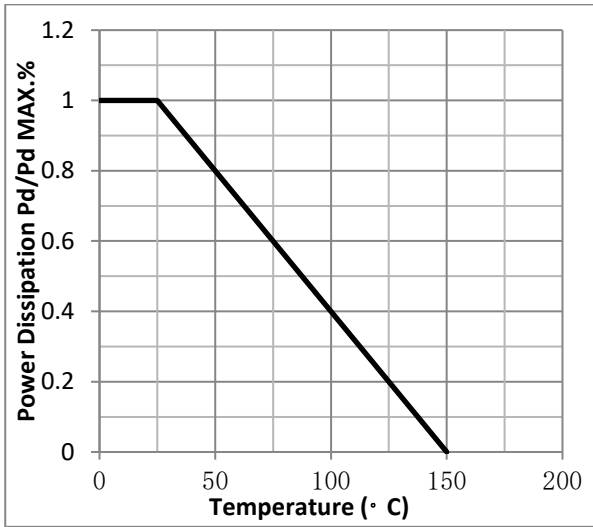


Fig.2 Typical output Characteristics

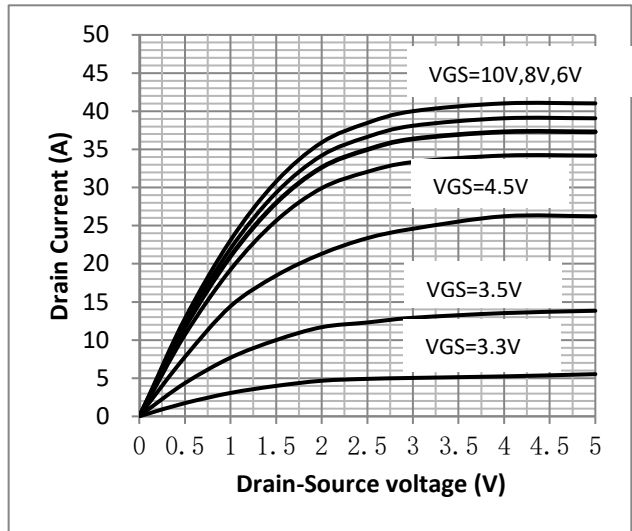


Fig.3 Threshold Voltage V.S Junction Temperature

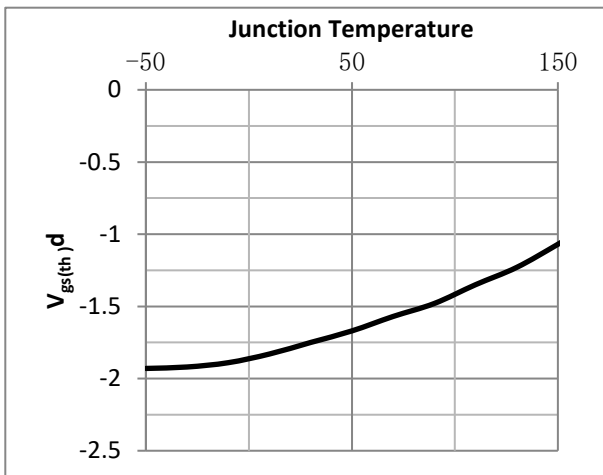


Fig.4 Resistance V.S Drain Current

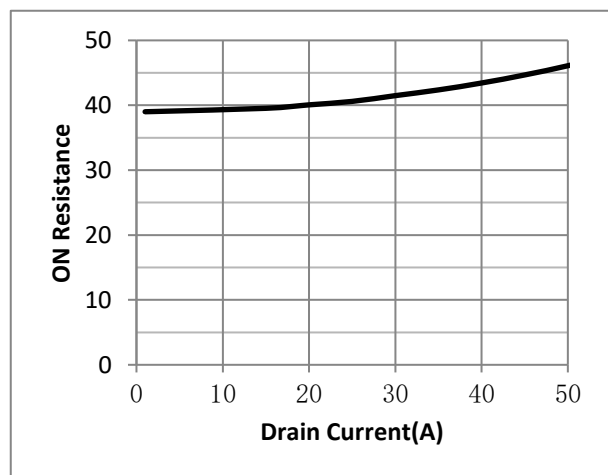


Fig.5 On-Resistance VS Gate Source Voltage

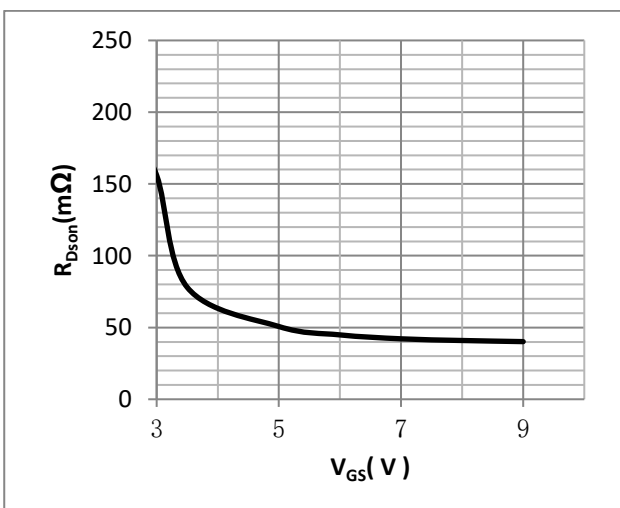


Fig.6 On-Resistance V.S Junction Temperature

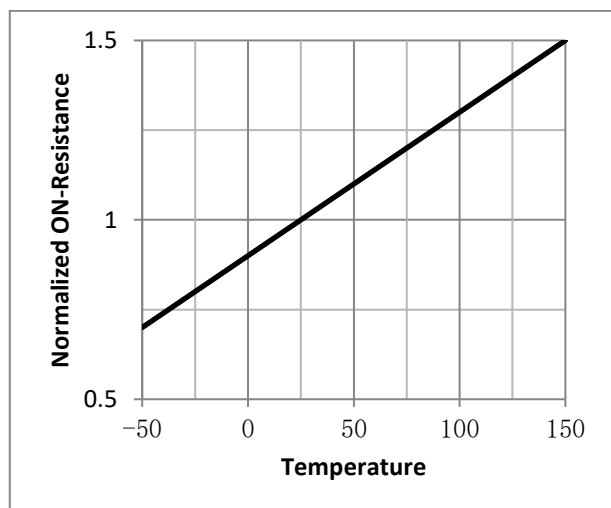


Fig.7 Maximum Forward Biased Safe Operating Area Fig.8 ID-Junction Temperature

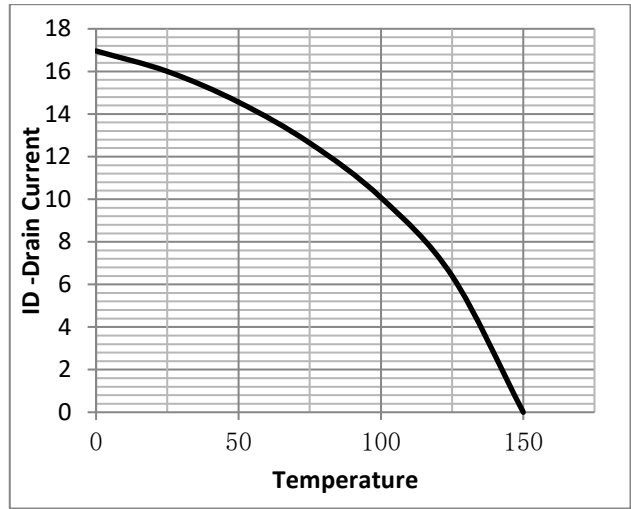
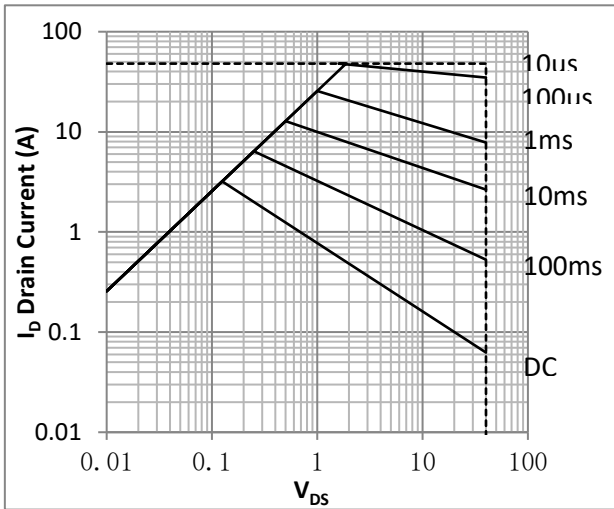


Fig.9 Switching Time Measurement Circuit

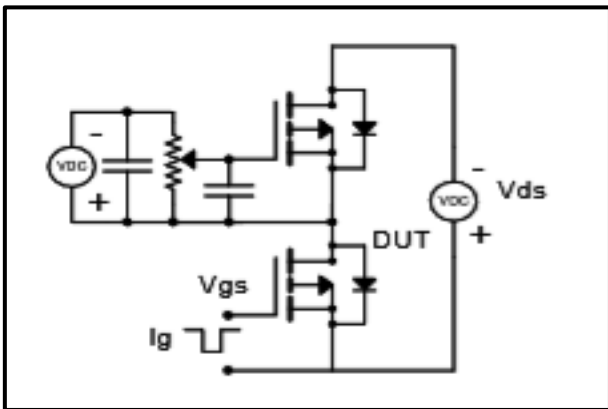


Fig.10 Gate Charge Waveform

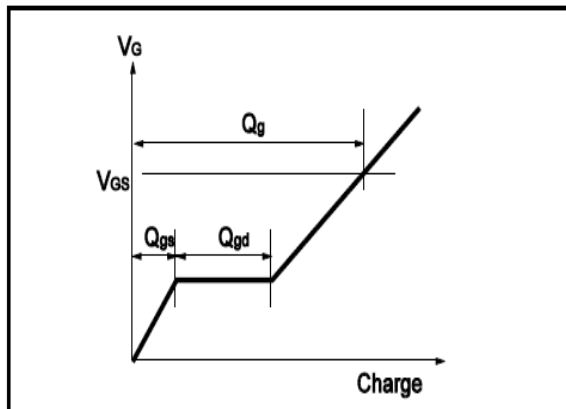


Fig.11 Switching Time Measurement Circuit

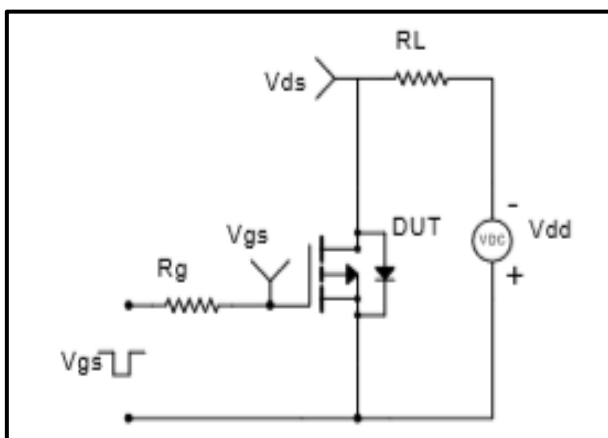


Fig.12 Gate Charge Waveform

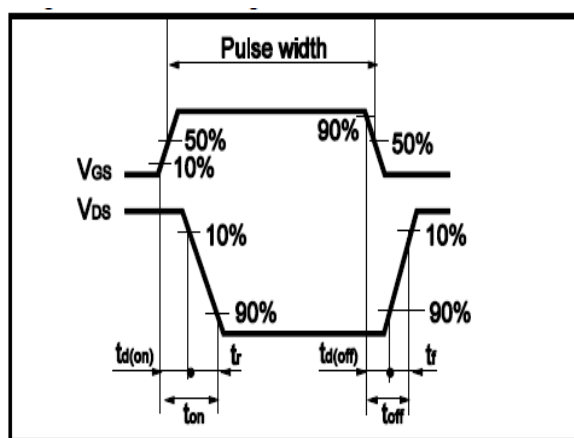


Fig.13 Avalanche Measurement Circuit

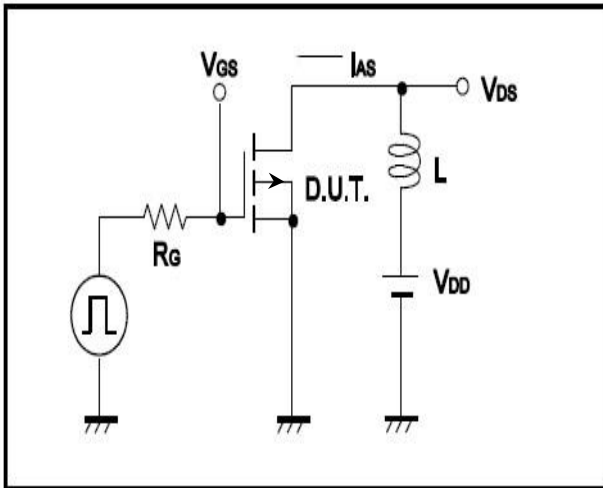
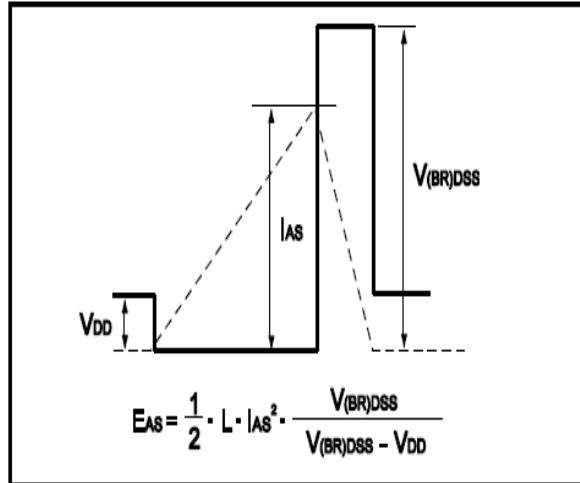


Fig.14 Avalanche Waveform



•Dimensions (TO-252)

Unit: mm

SYMBOL	min	max	SYMBOL	min	max
A	2.10	2.50	B	0.85	1.25
b	0.50	0.80	b1	0.50	0.90
b2	0.45	0.70	C	0.45	0.70
D	6.30	6.75	D1	5.10	5.50
E	5.30	6.30	e1	2.25	2.35
L1	9.20	10.60	e2	4.45	4.75
L2	0.90	1.75	L3	0.60	1.10
K	0.00	0.23			

