

**General Description**

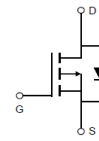
The ZM040P04N combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ . This device is ideal for load switch and battery protection applications.

**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**

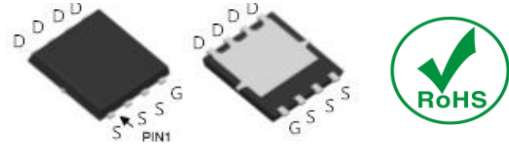
- MB/VGA Vcore
- SMPS 2<sup>nd</sup> Synchronous Rectifier
- POL application
- BLDC Motor driver

**Product Summary**


$V_{DS} = -40V$

$R_{DS(ON)} = 4m\Omega$

$I_D = -98A$



DFN5 x 6

**Ordering Information:**

Part NO.	ZM040P04N
Marking	ZM040P04
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

**Absolute Maximum Ratings (T<sub>C</sub> =25°C)**

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	-40	V
Gate-Source Voltage	$V_{GS}$	20	V
Continuous Drain Current	$I_D@TC=25^\circ C$	-98	A
	$I_D@TC=75^\circ C$	-74	A
	$I_D@TC=100^\circ C$	-62	A
Pulsed Drain Current ①	$I_{DM}$	-294	A
Total Power Dissipation	$P_D@TC=25^\circ C$	70	W
Total Power Dissipation	$P_D@TA=25^\circ C$	2.8	W
Operating Junction Temperature	$T_J$	-55 to 150	°C
Storage Temperature	$T_{STG}$	-55 to 150	°C
Single Pulse Avalanche Energy	$E_{AS}$	840	mJ

**•Thermal resistance**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R <sub>thJC</sub>	-	-	1.8	° C/W
Thermal resistance, junction - ambient	R <sub>thJA</sub>	-	-	45	° C/W
Soldering temperature, wavesoldering for 10s	T <sub>sold</sub>	-	-	265	° C

**•Electronic Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250uA	-40			V
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250uA	-1.2		-2.5	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = -40V, V <sub>GS</sub> = 0V			1.0	uA
Gate- Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V			±100	nA
Static Drain-source On Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -30A		4.0	5.2	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -25A		6.0	7.8	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -10V, I <sub>D</sub> = -20A		10		s

**•Electronic Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C <sub>iss</sub>	f = 1MHz	-	6970	-	pF
Output capacitance	C <sub>oss</sub>		-	616	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	243	-	

**•Gate Charge characteristics(T<sub>a</sub> = 25°C)**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q <sub>g</sub>	V <sub>DD</sub> = 25V	-	130	-	nC
Gate - Source charge	Q <sub>gs</sub>	I <sub>D</sub> = 5A	-	31	-	
Gate - Drain charge	Q <sub>gd</sub>	V <sub>GS</sub> = 10V	-	15	-	

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

Fig.1 Power Dissipation Derating Curve

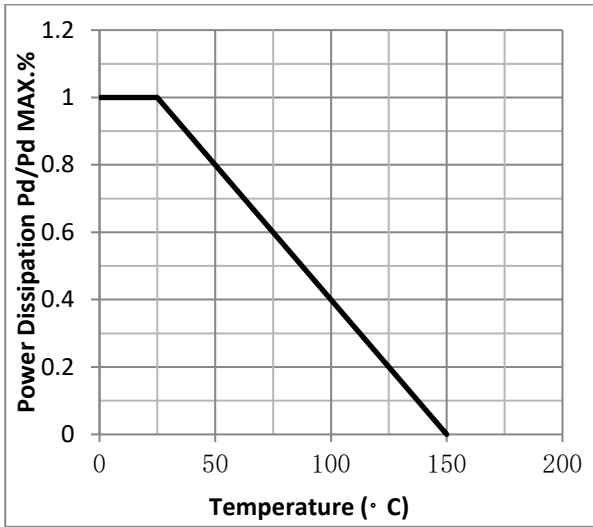


Fig.2 Typical output Characteristics

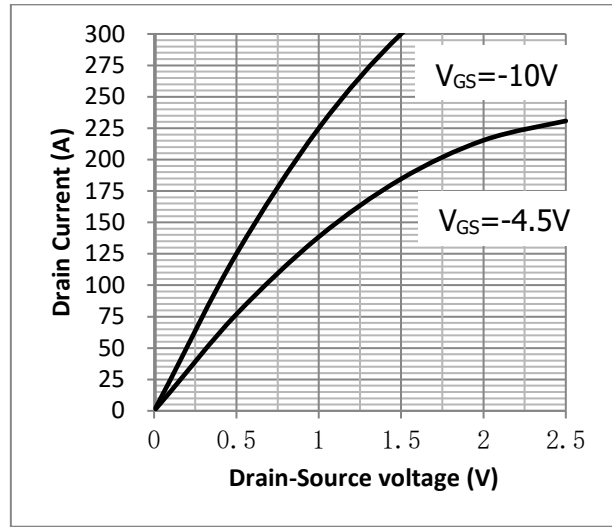


Fig.3 Threshold Voltage V.S Junction Temperature

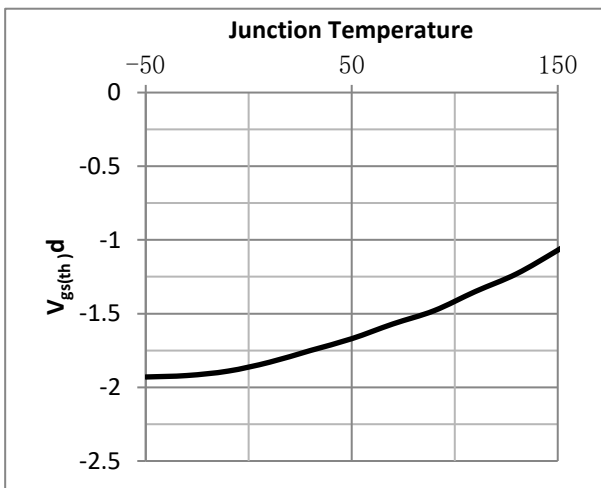


Fig.4 Resistance V.S Drain Current

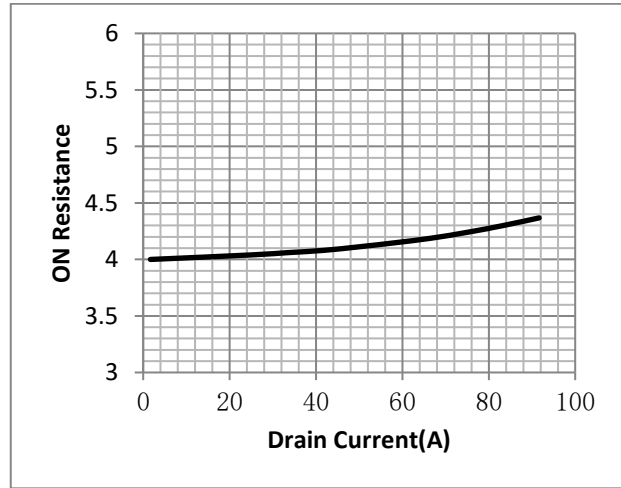


Fig.5 On-Resistance VS Gate Source Voltage

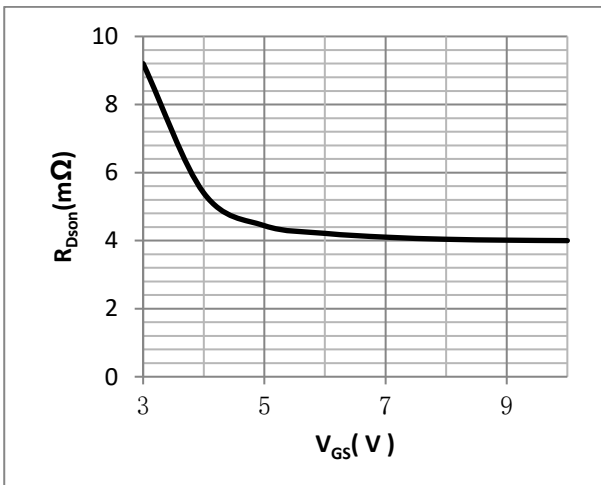


Fig.6 On-Resistance V.S Junction Temperature

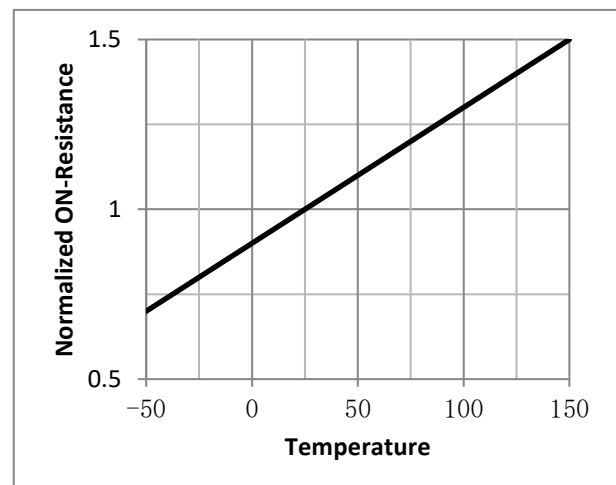


Fig.7 Switching Time Measurement Circuit

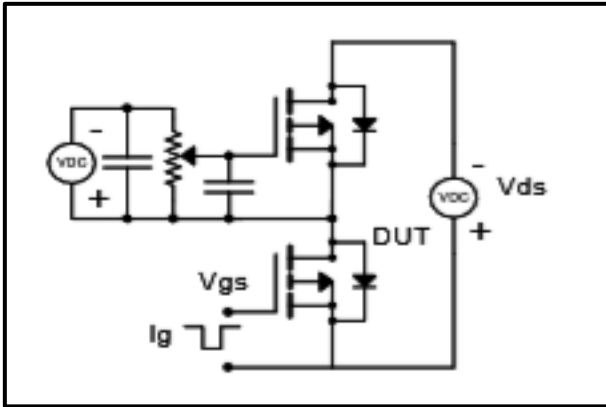


Fig.8 Gate Charge Waveform

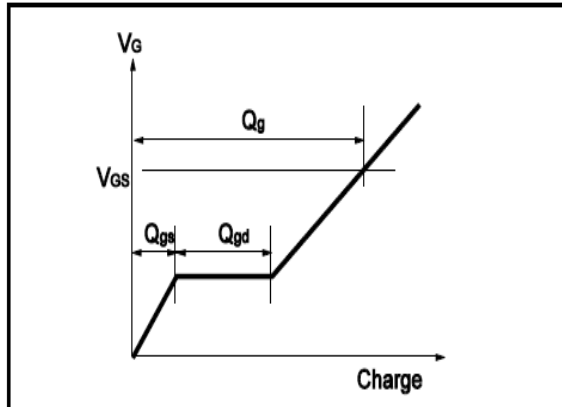


Fig.9 Switching Time Measurement Circuit

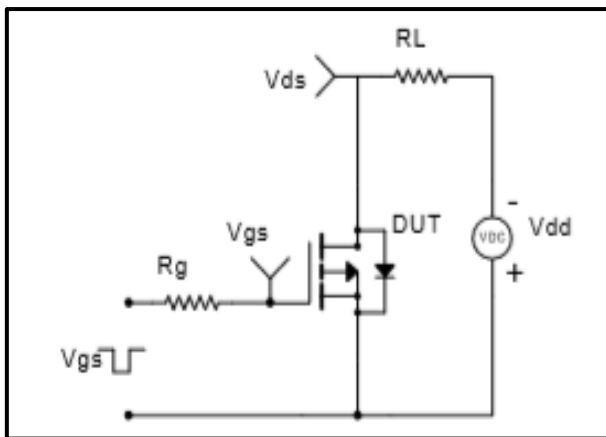


Fig.10 Gate Charge Waveform

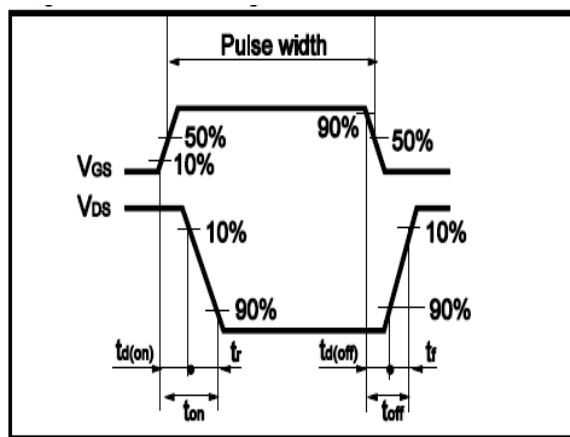


Fig.11 Avalanche Measurement Circuit

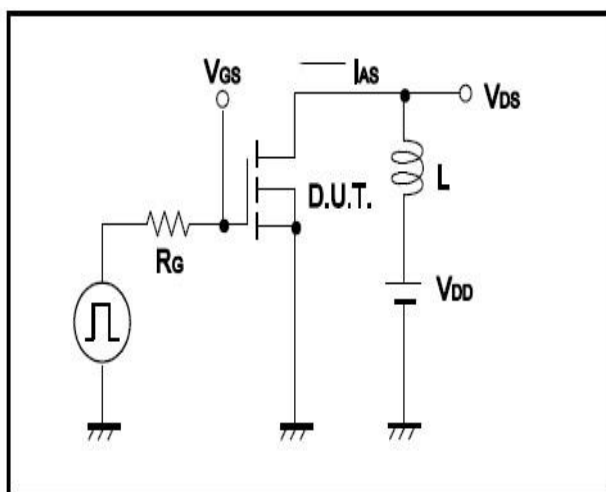
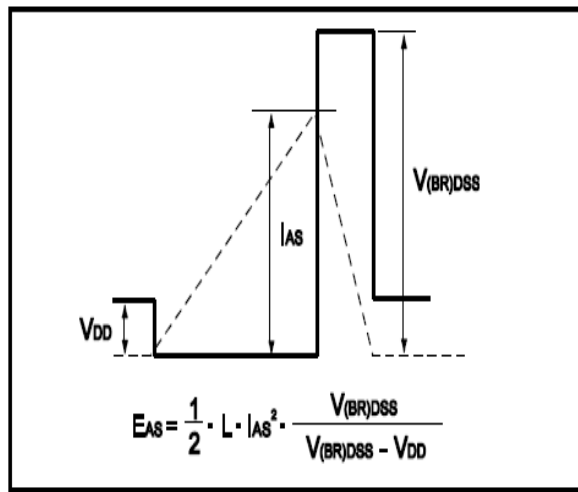


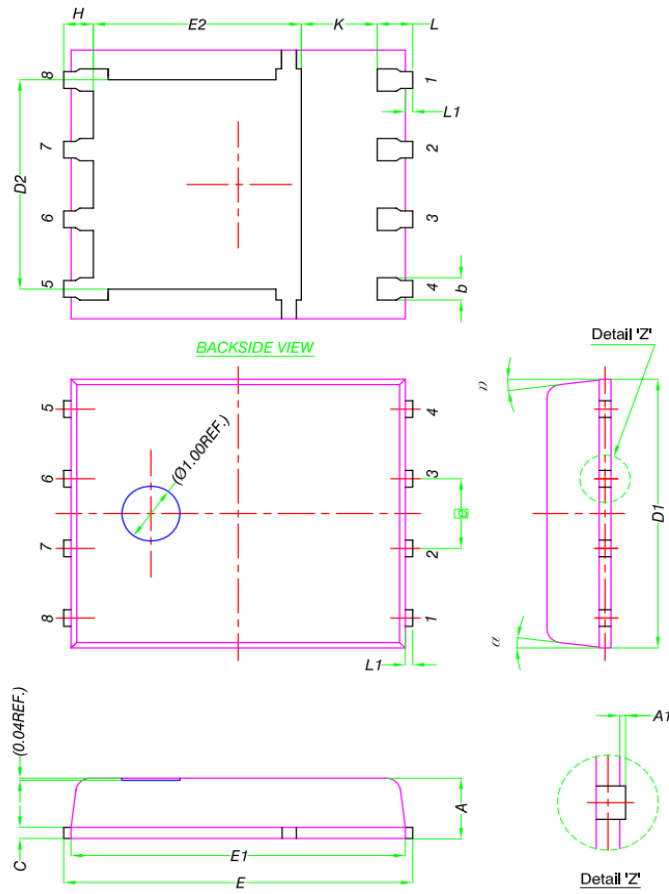
Fig.12 Avalanche Waveform





•Dimensions (DFN5x6)

Unit: mm



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
$\alpha$	0°	-	12°