

• General Description

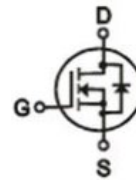
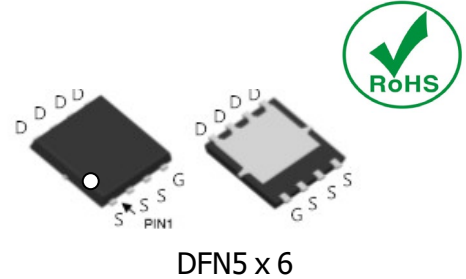
The ZM016N04HN combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

• 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

- Synchronous Rectification for AC-DC/DC-DC converter
- BLDC Motor driver

• Product Summary

 $V_{DS}=40V$
 $R_{DS(ON)} = 1.55m\Omega$
 $I_D=220A$


DFN5 x 6

• Ordering Information:

Part NO.	ZM016N04HNC
Marking	ZM016N04H
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

• 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	$I_{D@T_C=25^\circ C}$	220	A
	$I_{D@T_C=75^\circ C}$	165	A
	$I_{D@T_C=100^\circ C}$	138	A
Pulsed Drain Current ^①	I_{DM}	660	A
Total Power Dissipation	$P_D@T_C=25^\circ C$	85	W
Total Power Dissipation	$P_D@T_A=25^\circ C$	3.4	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ C$
Storage Temperature	T_{STG}	-55 to 150	$^\circ C$
Single Pulse Avalanche Energy@L=0.5mH	E_{AS}	1150	mJ

Single Pulse Avalanche Energy@L=0.1mH	E_{AS}	460	mJ
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•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	1.5	° C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	37	° C/W
Soldering temperature, wave soldering for 10s	T_{sold}	-	-	265	° C

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	2.0		4.0	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	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 40A$		1.55	2.1	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = 25V, I_D = 10A$		25		s
Source-drain voltage	V_{SD}	$I_S = 40A$			1.28	V

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$V_{GS} = 0V, V_{DS} = 20V$ $f = 1MHz$	-	6610	-	pF
Output capacitance	C_{oss}		-	460	-	
Reverse transfer capacitance	C_{rss}		-	210	-	

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

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Resistance	R_g	$f = 1MHz$		2.5		Ω
Total gate charge	Q_g	$V_{DD} = 20V$ $I_D = 25A$ $V_{GS} = 10V$	-	109	-	nC
Gate - Source charge	Q_{gs}		-	18	-	
Gate - Drain charge	Q_{gd}		-	21	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS} = 10V, V_{DS} = 15V$		12		ns

Turn-ON Rise time	t_r	$R_G = 3.3\Omega,$ $I_D = 25A$	14	ns
Turn-Off Delay time	$t_{D(off)}$		89	ns
Turn-Off Fall time	t_f		34	ns
Reverse Recovery Time	t_{RR}	$V_{DD} = 20 V,$ $dI_S/dt=100A/us,$ $I_S = 30 A$	25	ns
Charge Time	t_a		14	ns
Discharge Time	t_b		11	ns
Reverse Recovery Charge	Q_{RR}		16	ns

Note: ① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;

Fig.1 Gate-Charge Characteristics

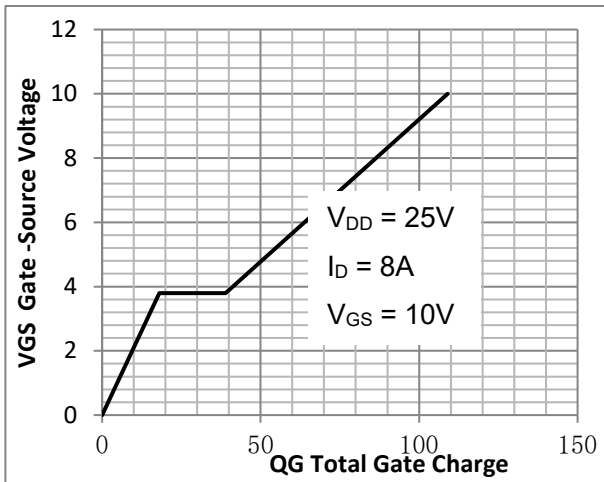


Fig.2 Capacitance Characteristics

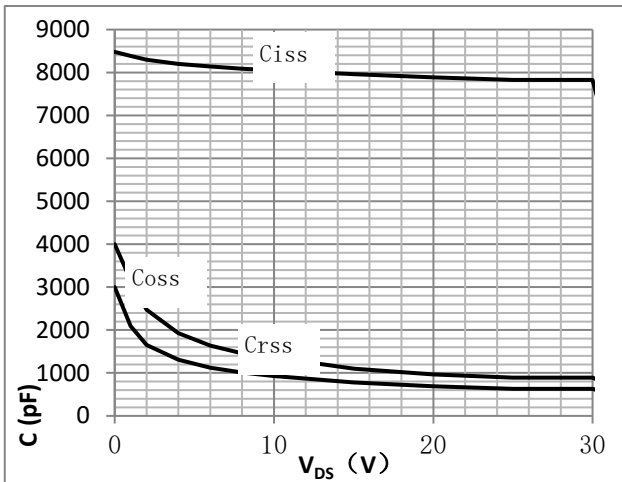


Fig.3 Power Dissipation

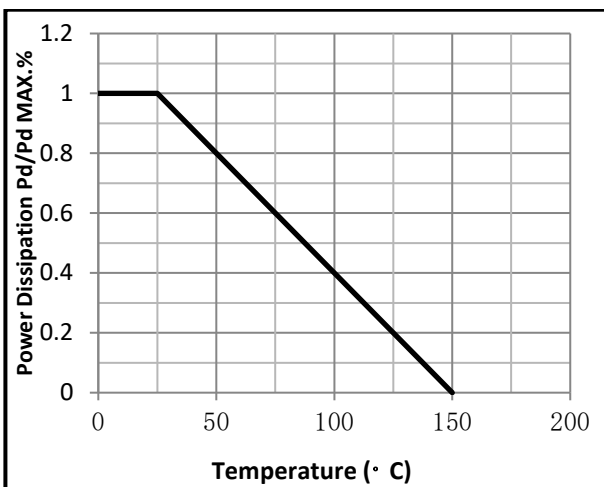


Fig.4 Typical output Characteristics

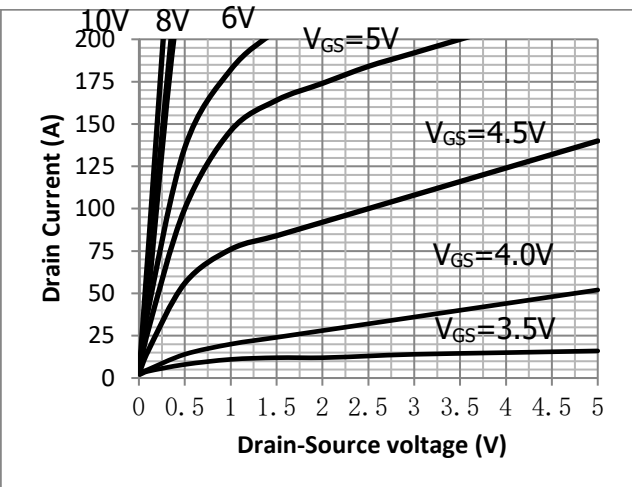


Fig.5 Threshold Voltage V.S Junction Temperature

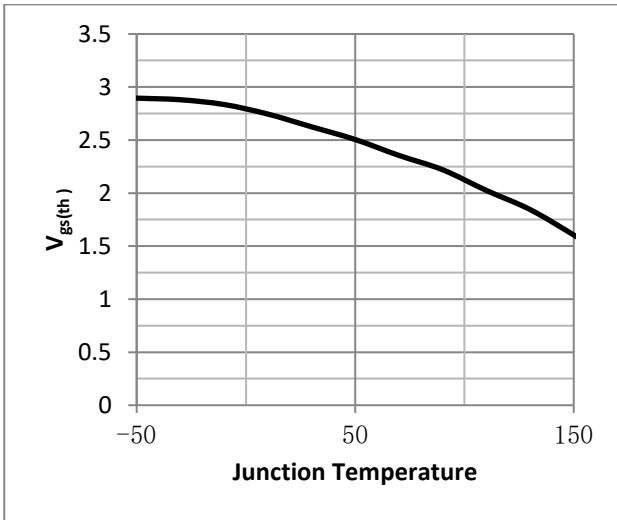


Fig.6 Resistance V.S Drain Current

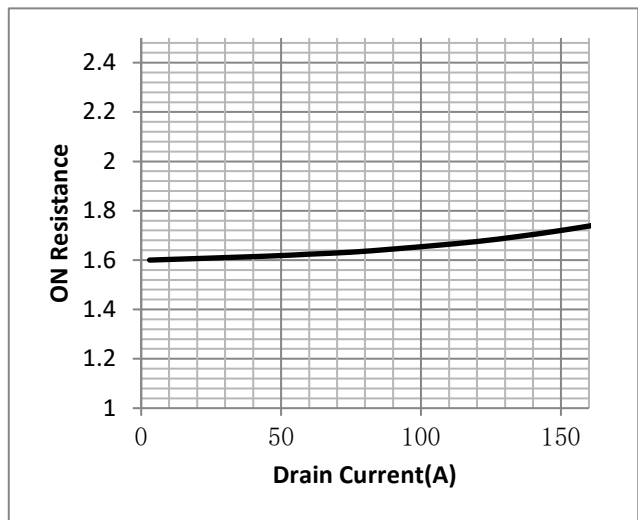


Fig.7 On-Resistance VS Gate Source Voltage

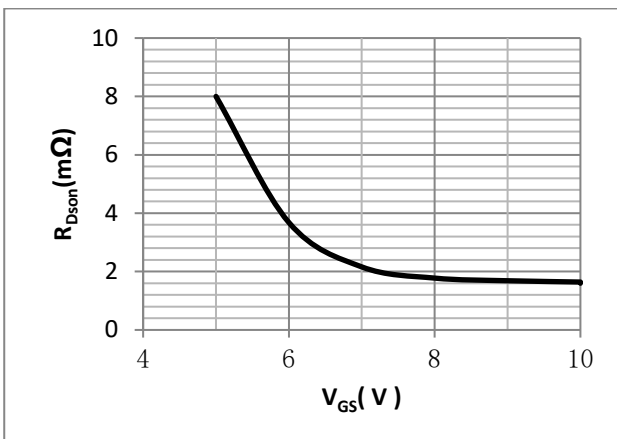


Fig.8 On-Resistance V.S Junction Temperature

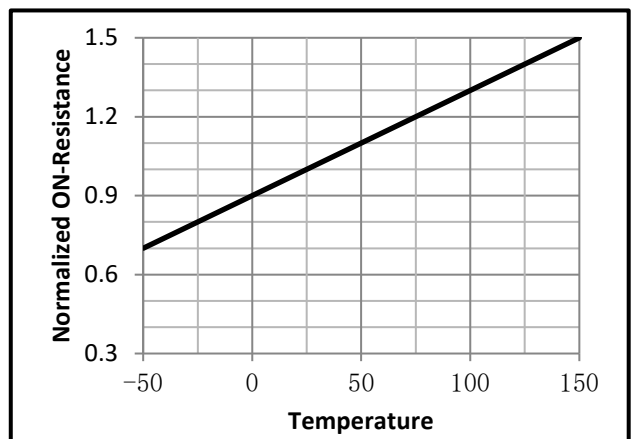


Figure 9. Diode Forward Voltage vs. Current

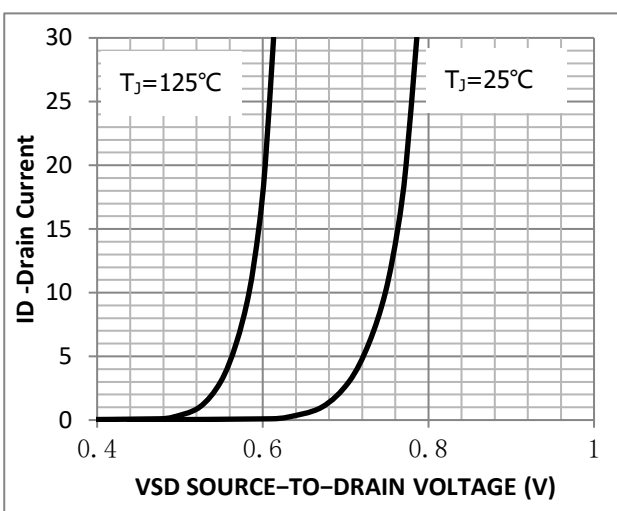


Figure 10. Transfer Characteristics

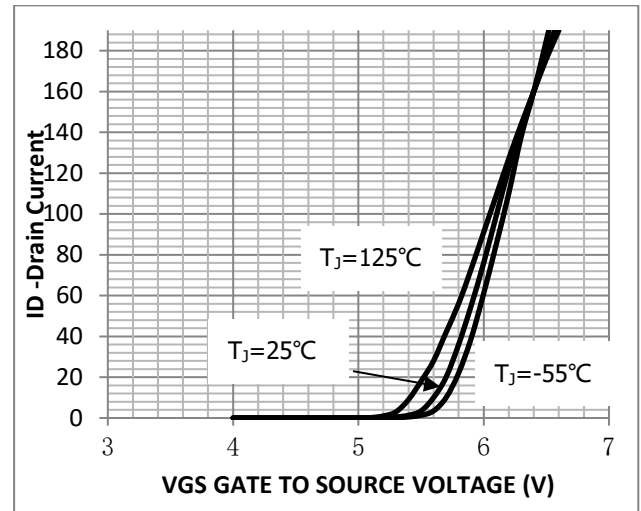


Fig.11 SOA Maximum Safe Operating Area

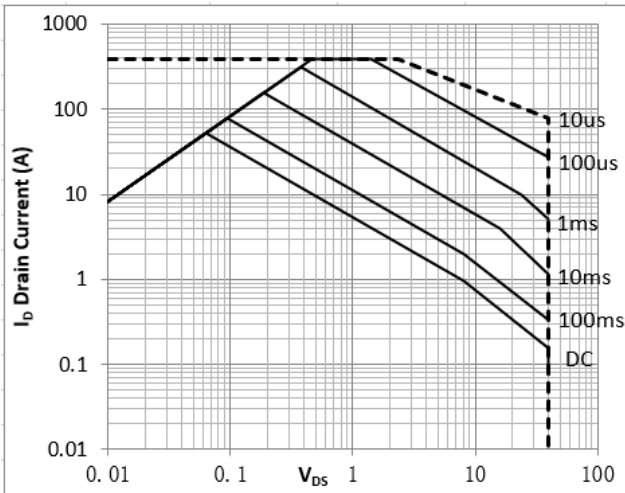


Fig.12 ID-Junction V.S Temperature

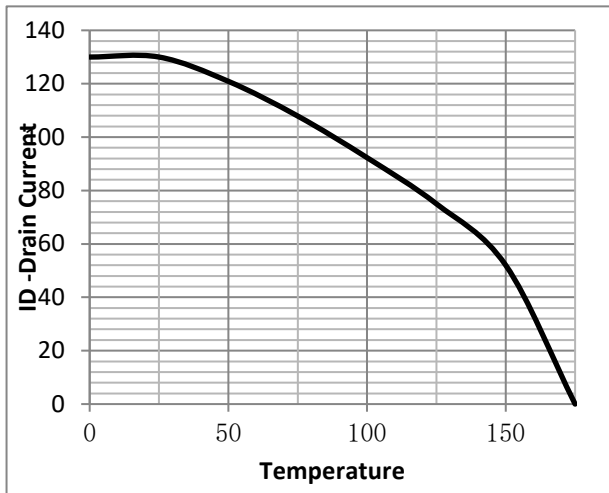


Fig.12 Switching Time Measurement Circuit

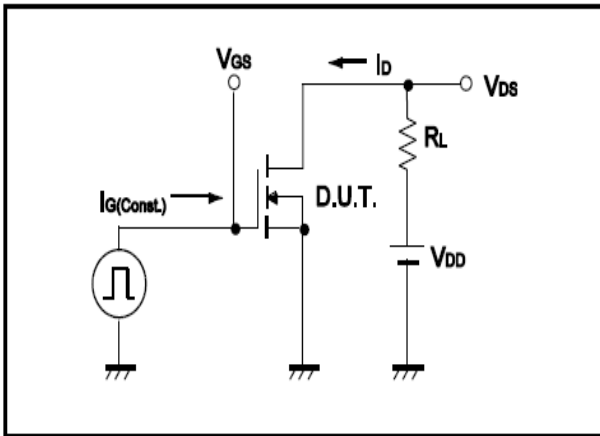


Fig.14 Gate Charge Waveform

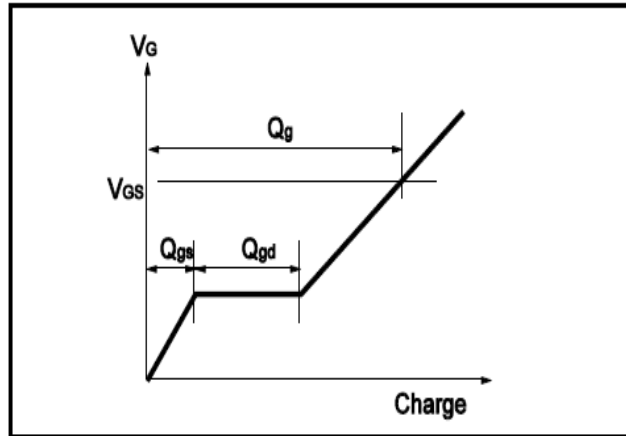


Fig.15 Switching Time Measurement Circuit

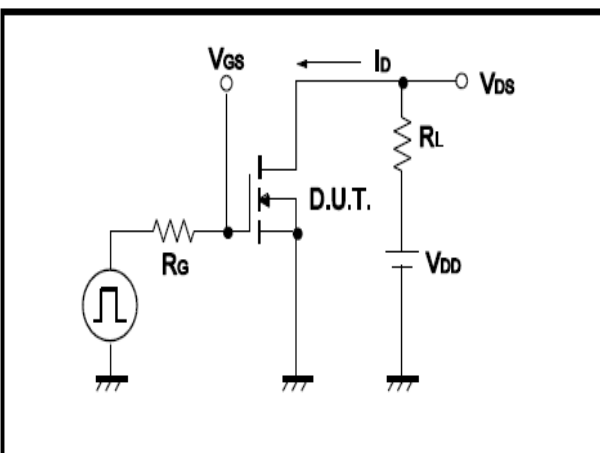
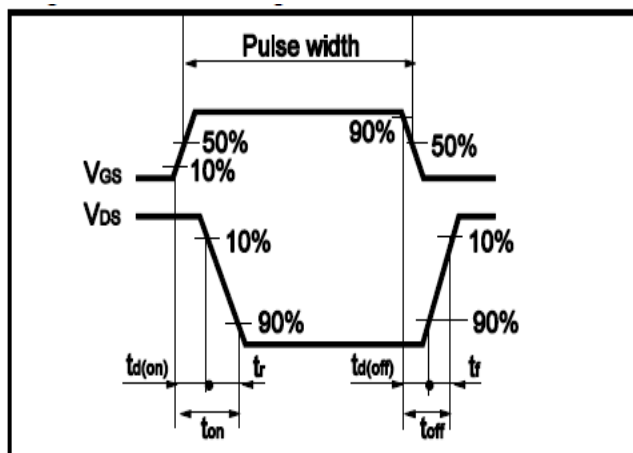


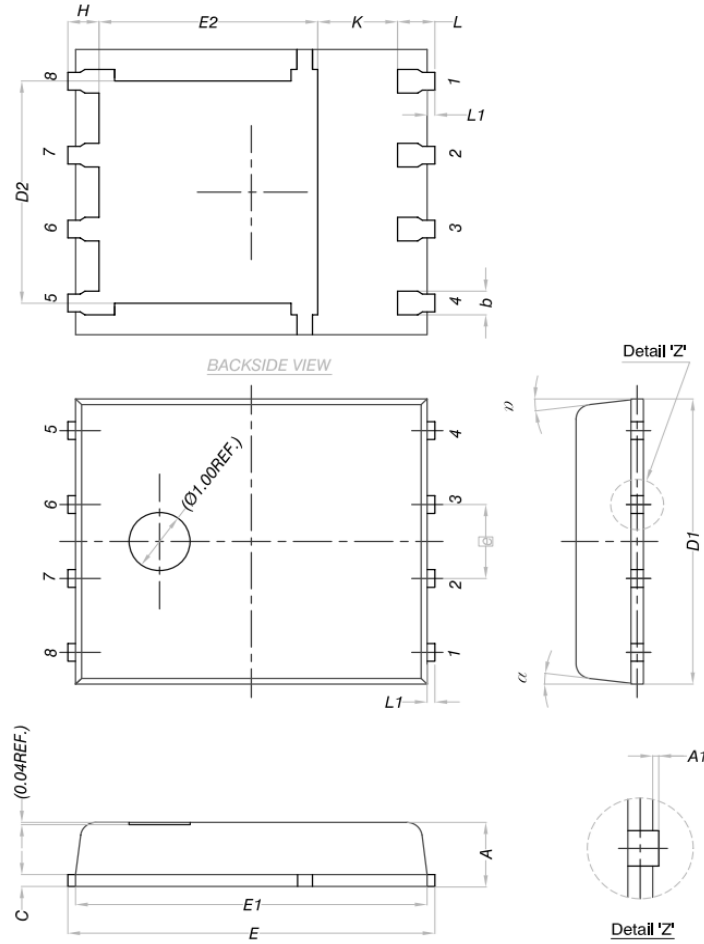
Fig.16 Gate Charge Waveform





•Dimensions (DFN5×6)

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
α	0°	-	12°