

**• General Description**

The ZM060N06F 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**

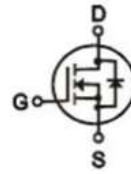
- MB/VGA Vcore
- SMPS 2<sup>nd</sup> Synchronous Rectifier
- POL application
- BLDC Motor driver

**• Ordering Information:**

Part NO.	ZM060N06F
Marking	ZM060N06
Packing Information	Bulk Tube
Basic ordering unit (pcs)	1000

**• Absolute Maximum Ratings ( $T_C = 25^\circ\text{C}$ )**

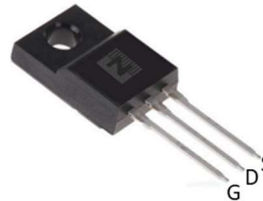
Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_{D@TC=25^\circ\text{C}}$	50	A
	$I_{D@TC=75^\circ\text{C}}$	38	A
	$I_{D@TC=100^\circ\text{C}}$	31	A
Pulsed Drain Current <sup>①</sup>	$I_{DM}$	160	A
Total Power Dissipation( $TC=25^\circ\text{C}$ )	$P_{D@TC=25^\circ\text{C}}$	75	W
Total Power Dissipation( $TA=25^\circ\text{C}$ )	$P_{D@TA=25^\circ\text{C}}$	2	W
Operating Junction Temperature	$T_J$	-55 to 150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 to 150	$^\circ\text{C}$

**• Product Summary**


$V_{DS} = 60\text{V}$

$R_{DS(ON)} = 6\text{m}\Omega$

$I_D = 50\text{A}$



TO-220F



**•Thermal resistance**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	$R_{thJC}$	-	-	1.7	$^{\circ}C/W$
Thermal resistance, junction - ambient	$R_{thJA}$	-	-	62.5	$^{\circ}C/W$
Soldering temperature, wavesoldering for 10s	$T_{sold}$	-	-	265	$^{\circ}C$

**•Electronic Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	60			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.7	2.5	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$			1.0	$\mu A$
Gate- Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=16A$		6.0	7.8	$m\Omega$
		$V_{GS}=4.5V, I_D=10A$		7.5	8.5	$m\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=25V, I_D=8A$		28		S
Source-drain voltage	$V_{SD}$	$I_S=16A$			1.28	V

**•Electronic Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	$C_{iss}$	f = 1MHz V <sub>DS</sub> =25V	-	4200	-	pF
Output capacitance	$C_{oss}$		-	290	-	
Reverse transfer capacitance	$C_{rss}$		-	130	-	

**•Switching Parameters( $T_a = 25^{\circ}C$ )**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	$Q_g$	$V_{DD} = 30V$	-	56	-	nC
Gate - Source charge	$Q_{gs}$	$I_D = 15A$	-	16	-	
Gate - Drain charge	$Q_{gd}$	$V_{GS} = 10V$	-	26	-	
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F=20A,$ $di/dt=100A/\mu s$		27		nS
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F=20A,$ $di/dt=100A/\mu s$		65		nC

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

Fig.1 Power Dissipation

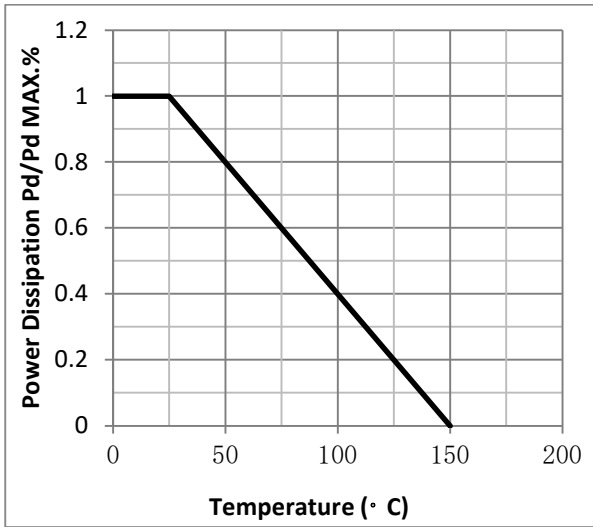


Fig.2 Typical output Characteristics

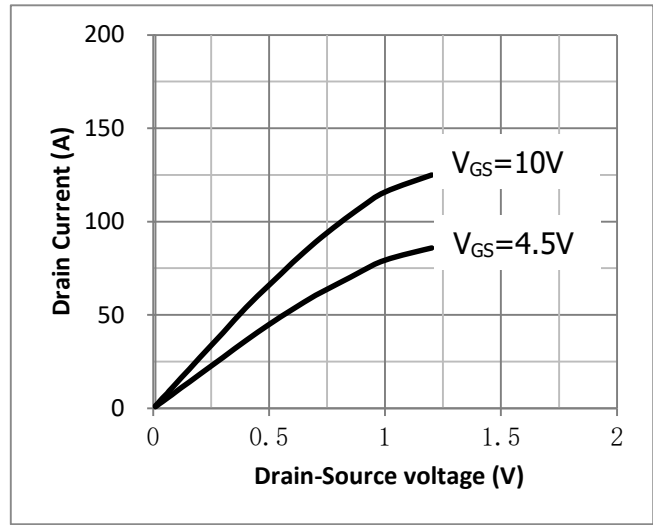


Fig.3 Threshold Voltage V.S Junction Temperature

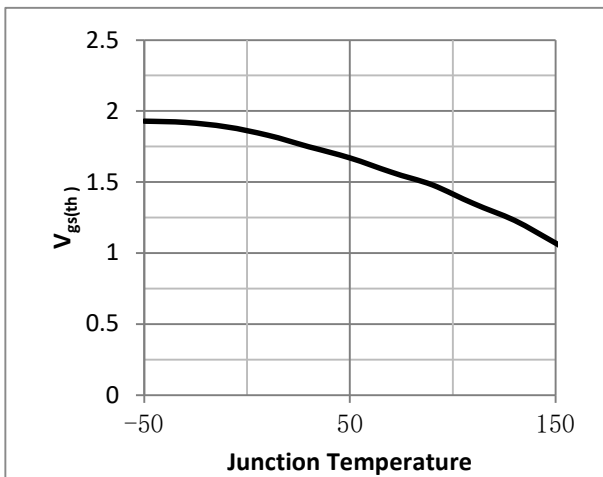


Fig.4 Resistance V.S Drain Current

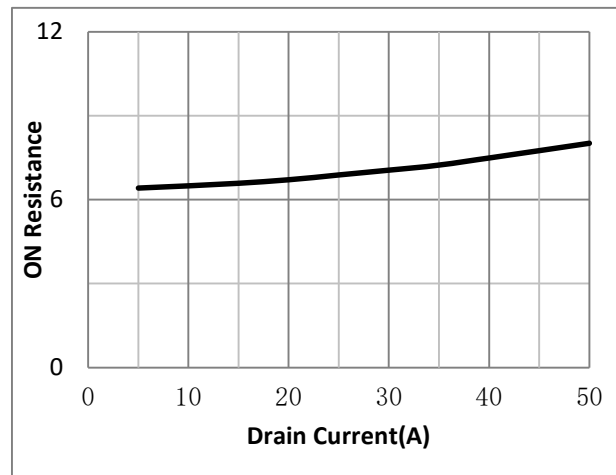


Fig.5 On-Resistance VS Gate Source Voltage

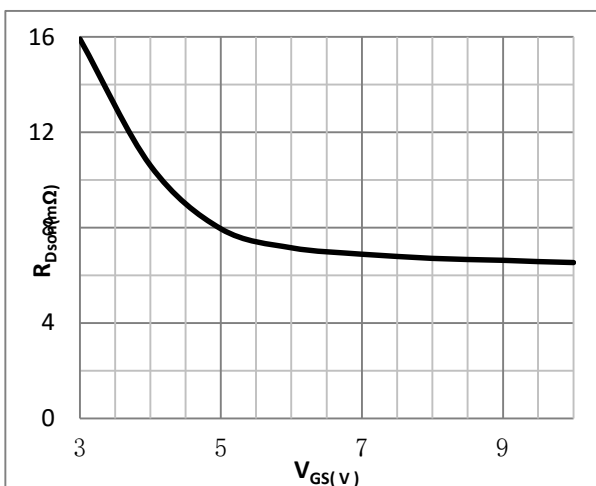


Fig.6 On-Resistance V.S Junction Temperature

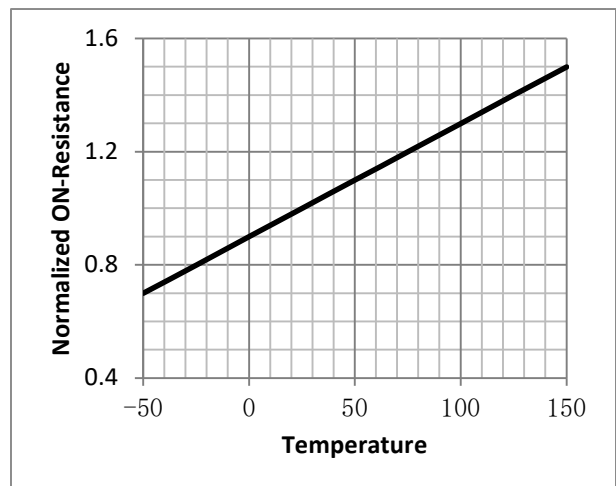


Fig.7 Switching Time Measurement Circuit

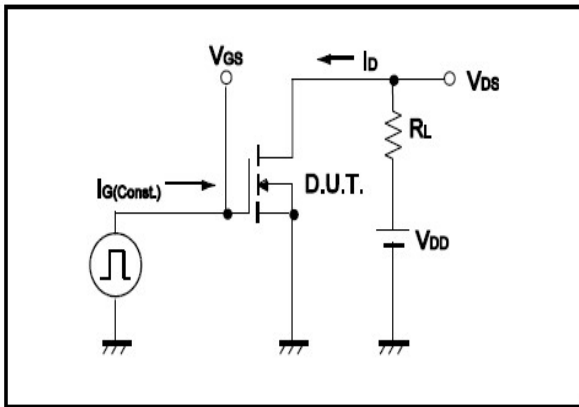


Fig.8 Gate Charge Waveform

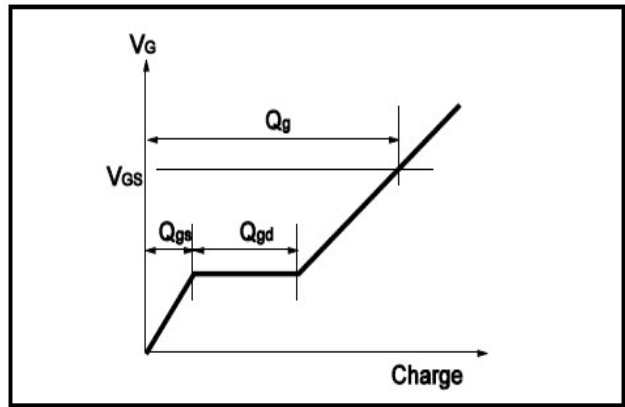


Fig.9 Switching Time Measurement Circuit

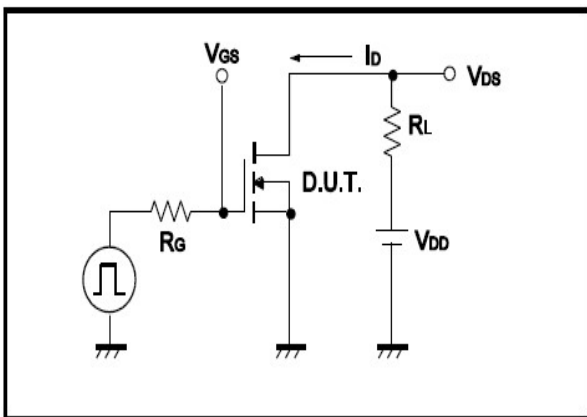


Fig.10 Gate Charge Waveform

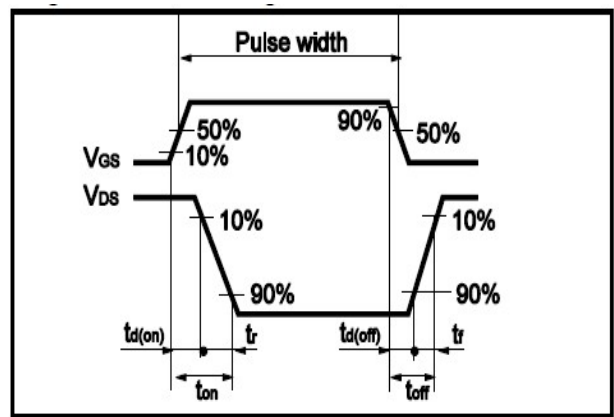


Fig.11 Avalanche Measurement Circuit

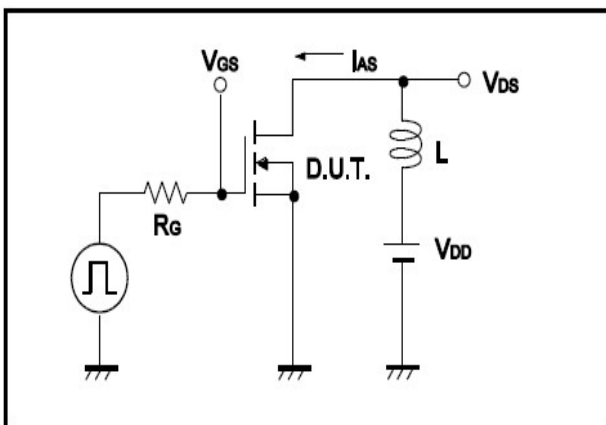
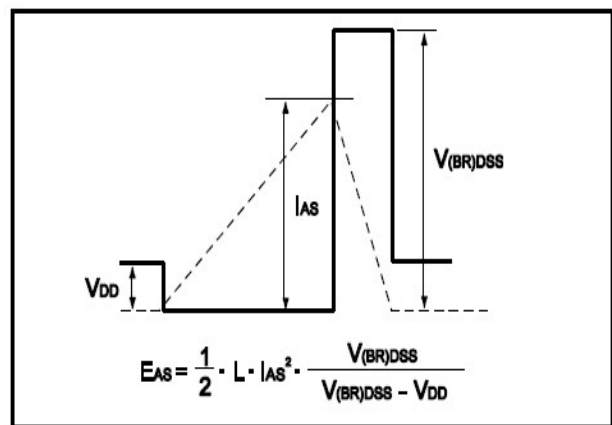


Fig.12 Avalanche Waveform





•Dimensions (TO-220F)

Unit: mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
C	4.5	4.9	b1	2.90	3.90
c	0.4	0.6	a	1.08	1.48
A	9.96	10.36	a1	0.70	0.90
B	15.67	16.07	E	2.34	2.74
B1	3.30	3.50	E1	2.34	2.74
R	3.08	3.28	C1	2.34	2.74
b	12.48	13.48	C2	2.56	2.96

