

### • General Description

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

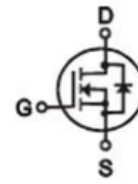
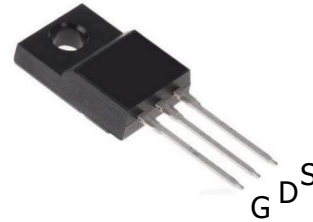
### • Features

- 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
- Oring switches
- Power Tools

### • Product Summary


 $V_{DS} = 100V$ 
 $R_{DS(ON)} = 5.2m\Omega$ 
 $I_D = 90A$ 


TO-220



### • Ordering Information:

Part NO.	ZMS050N10F
Marking	ZMS050N10
Packing Information	REEL TAPE
Basic ordering unit (pcs)	800

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D @ T_C = 25^\circ C$	90	A
	$I_D @ T_C = 75^\circ C$	68	A
	$I_D @ T_C = 100^\circ C$	57	A
Pulsed Drain Current ①	$I_{DM}$	270	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 @ $L = 0.1mH$	$E_{AS}$	240	mJ

**•Thermal resistance**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R <sub>thJC</sub>	-	-	1.5	° C/W
Thermal resistance, junction - ambient	R <sub>thJA</sub>	-	-	37	° C/W
Soldering temperature, wave soldering 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	100			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> =100V, 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> =25A @ TC=25°C		5.2	6.8	mΩ
		V <sub>GS</sub> =10V, I <sub>D</sub> =25A @ TC=125°C		6.7		mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A @ TC=25°C		6.5	8.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A @ TC=125°C		8.6		mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =25V, I <sub>D</sub> =10A		28		s
Source-drain voltage	V <sub>SD</sub>	I <sub>S</sub> =25A			1.28	V

**•Dynamic Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V  f = 1MHz	-	2820	-	pF
Output capacitance	C <sub>oss</sub>		-	1270	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	31	-	
Total gate charge	Q <sub>g</sub>	V <sub>DD</sub> = 25V	-	34	-	nC
Gate - Source charge	Q <sub>gs</sub>	I <sub>D</sub> = 8A	-	6.4	-	
Gate - Drain charge	Q <sub>gd</sub>	V <sub>GS</sub> = 10V	-	3.4	-	
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =20A, di/dt=100A/μs		23		nS
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> =20A, di/dt=100A/μs		120		nC

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

Fig.1 Gate-Charge Characteristics

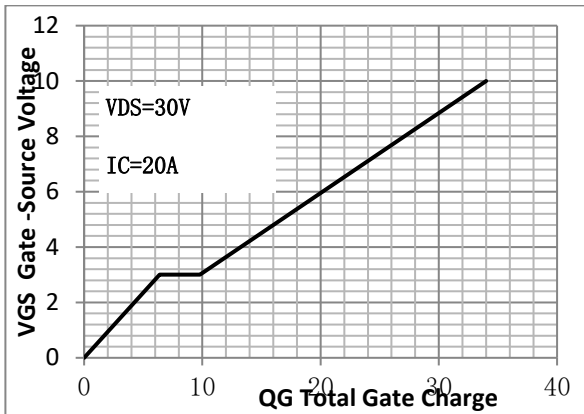


Fig.2 Capacitance Characteristics

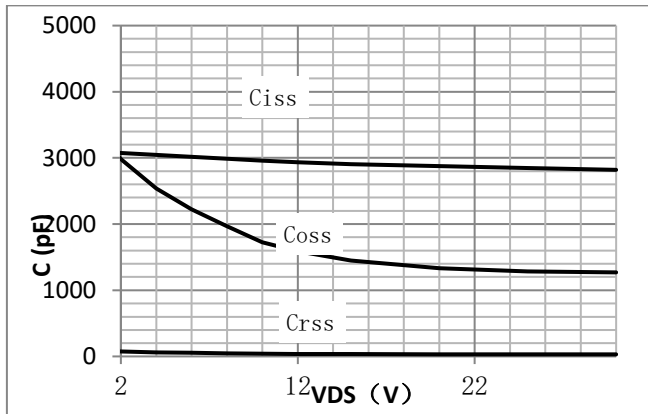


Fig.3 Power Dissipation

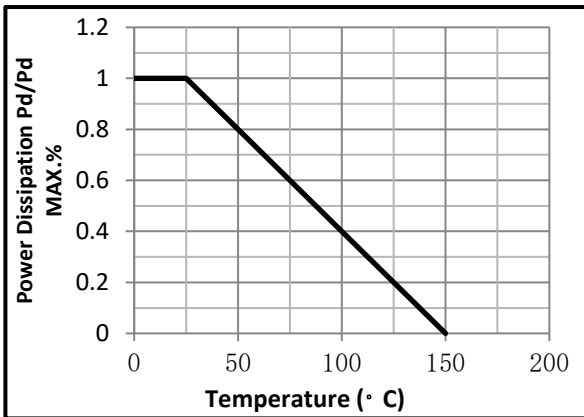


Fig.4 Typical output Characteristics

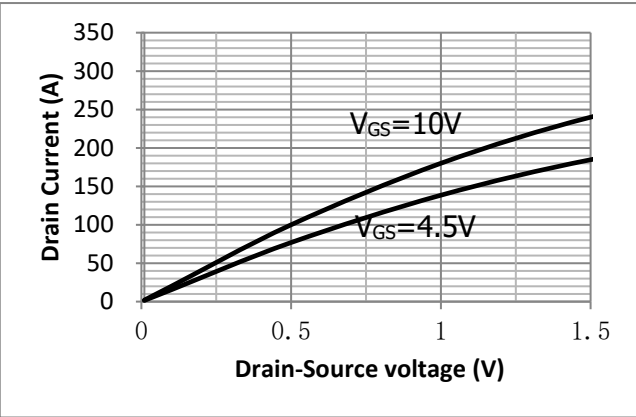


Fig.5 Threshold Voltage V.S Junction Temperature

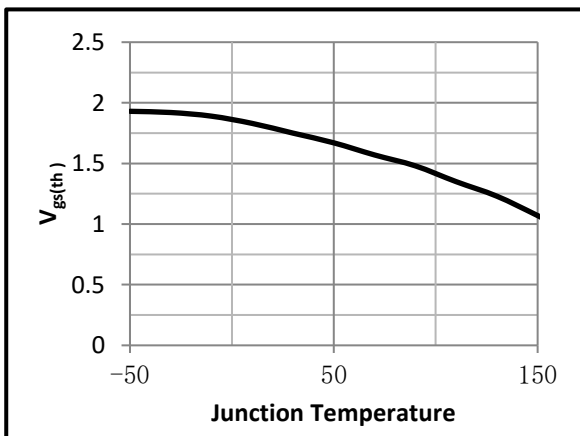


Fig.6 Resistance V.S Drain Current

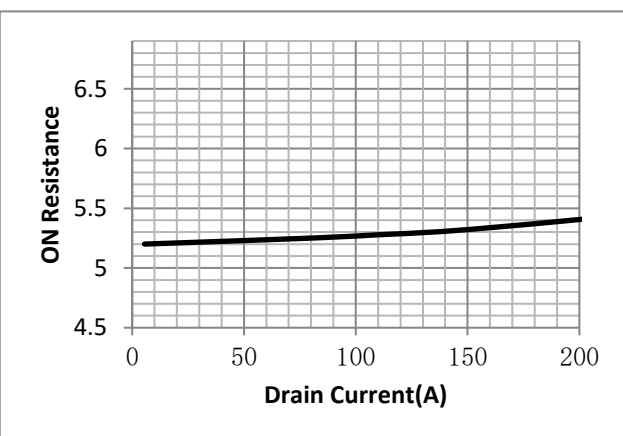


Fig.7 On-Resistance VS Gate Source Voltage

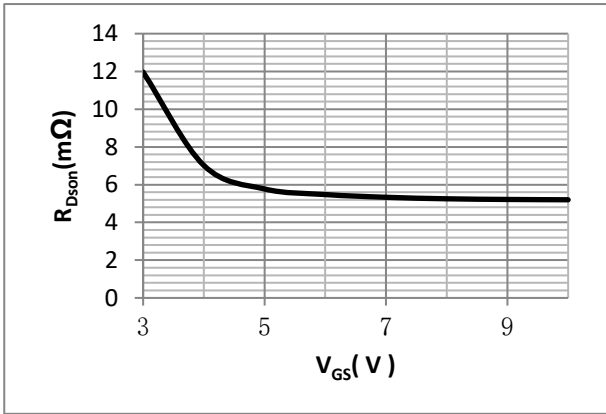


Fig.8 On-Resistance V.S Junction Temperature

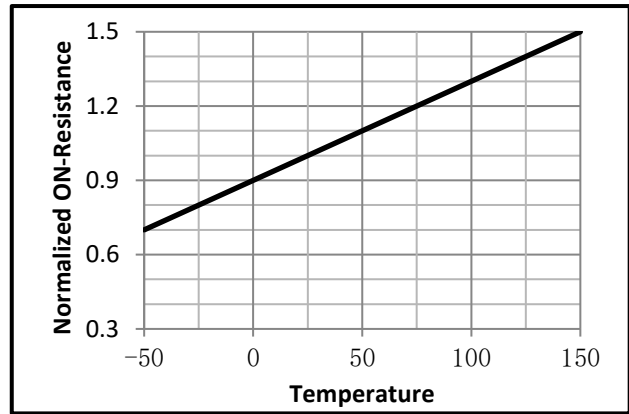


Fig.9 SOA Maximum Safe Operating Area

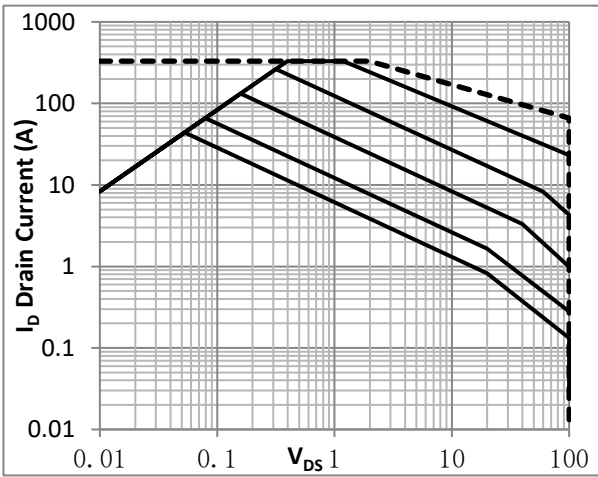


Fig.10  $I_D$ -Junction Temperature

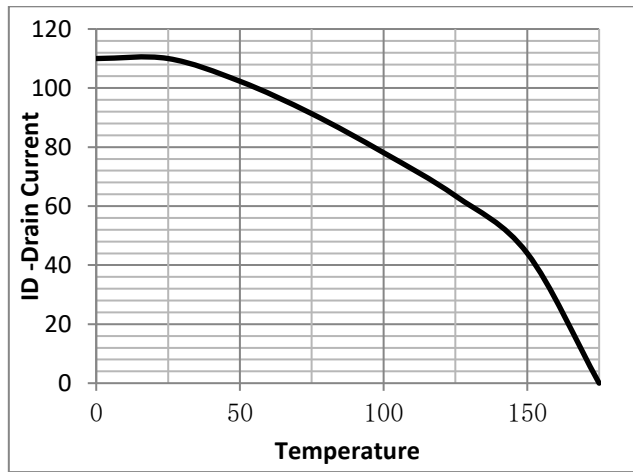


Fig.11 Switching Time Measurement Circuit

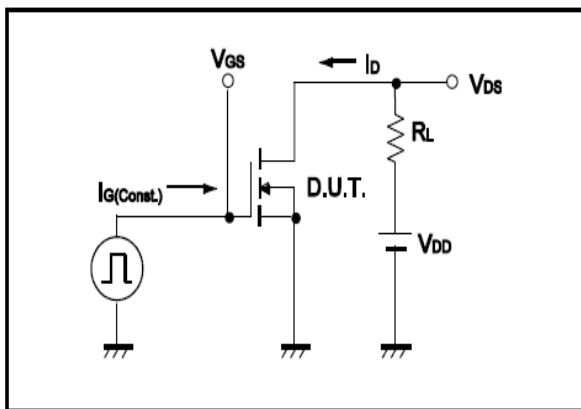


Fig.12 Gate Charge Waveform

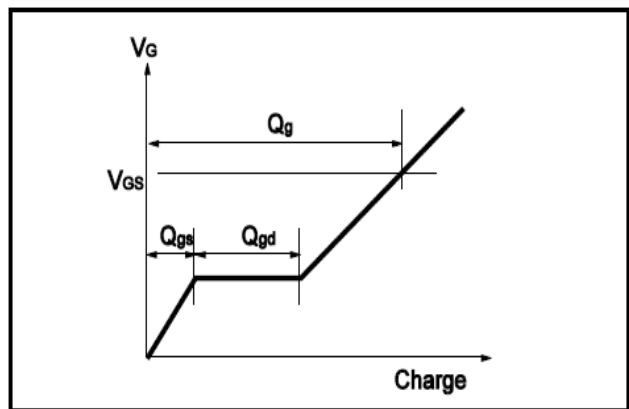


Fig.13 Switching Time Measurement Circuit

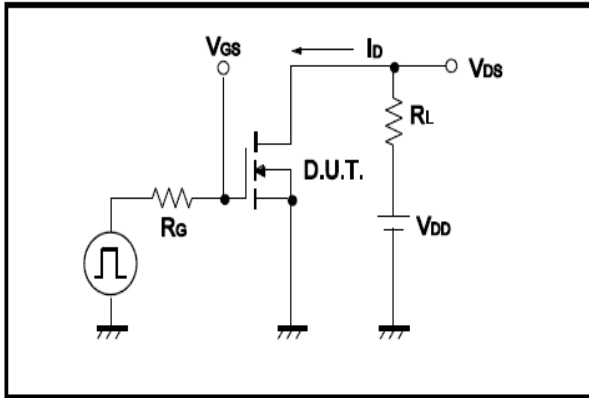


Fig.14 Gate Charge Waveform

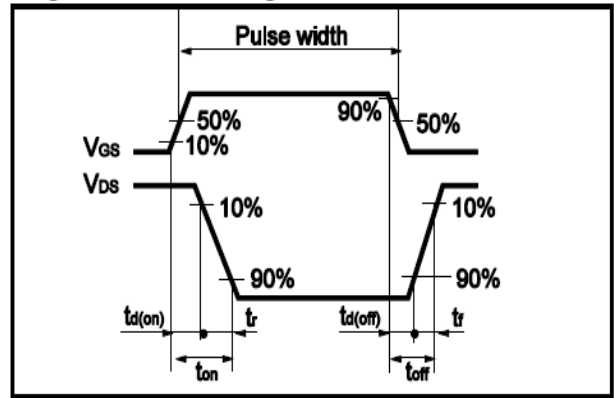


Fig.15 Avalanche Measurement Circuit

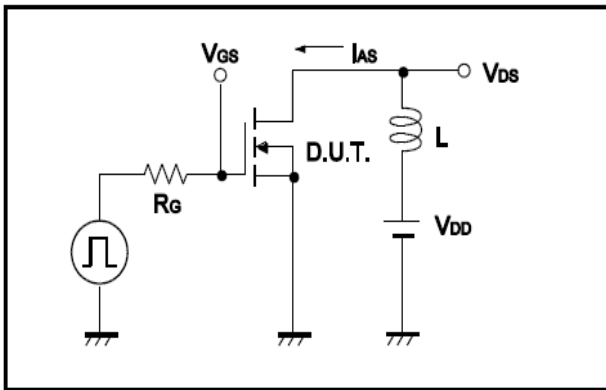
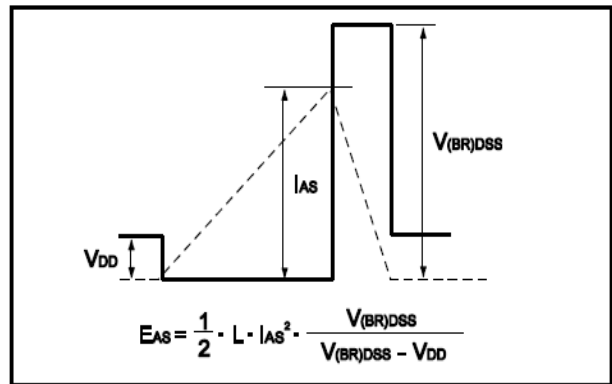


Fig.16 Avalanche Waveform





• Dimensions (TO-220F)

Unit: mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	4.40		4.95	e		2.54	
A <sub>1</sub>	2.30		2.90	L	12.50		14.30
b	0.45		0.90	L <sub>1</sub>	9.10		10.05
b <sub>1</sub>	1.10		1.70	L <sub>2</sub>	15.00		16.00
c	0.35		0.90	L <sub>3</sub>	3.00		4.00
D	14.50		17.00	øp	3.00		3.50
D <sub>1</sub>	6.10		9.00	Q	2.30		2.80
E	9.60		10.30				

