



**• General Description**

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

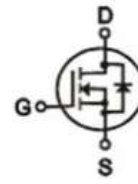
**• Features**

- Advance high cell density Trench technology
- Low  $R_{DS(ON)}$  to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

**• Application**

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

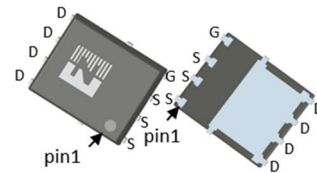
**• Product Summary**



$V_{DS} = 30V$

$R_{DS(ON)} = 5.1m\Omega$

$I_D = 55A$



DFN5 x 6

**• Ordering Information:**

Part NO.	ZMS051N03N
Marking	ZMS051N03
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	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current	$I_D @TC=25^\circ C$	55	A
	$I_D @TC=75^\circ C$	42	A
	$I_D @TC=100^\circ C$	34	A
Pulsed Drain Current <sup>①</sup>	$I_{DM}$	165	A
Total Power Dissipation(TC=25°C)	$P_D@TC=25^\circ C$	27	W
Total Power Dissipation(TA=25°C)	$P_D@TA=25^\circ C$	2.5	W
Operating Junction Temperature	$T_J$	-55 to 150	°C
Storage Temperature	$T_{STG}$	-55 to 150	°C
Single Pulse Avalanche Energy	$E_{AS}$	20	mJ



### • Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	$R_{thJC}$	-	-	4.5	$^{\circ}C/W$
Thermal resistance, junction - ambient	$R_{thJA}$	-	-	50	$^{\circ}C/W$
Soldering temperature, wave soldering for 10s	$T_{sold}$	-	-	265	$^{\circ}C$

### • Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	30			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	$I_{DSS}$	$V_{DS} = 30V, V_{GS} = 0V$			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	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 20A$		5.1	6.6	m $\Omega$
		$V_{GS} = 4.5V, I_D = 10A$		6.5	8.5	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = 25V, I_D = 4A$		5		s
Source-drain voltage	$V_{SD}$	$I_S = 20A$			1.28	V

### • Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	$C_{iss}$	$V_{DS} = 25V$ $f = 1MHz$	-	675	-	pF
Output capacitance	$C_{oss}$		-	186	-	
Reverse transfer capacitance	$C_{rss}$		-	16	-	

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

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Total gate charge	$Q_g$	$V_{DD} = 15V$ $I_D = 20A$ $V_{GS} = 10V$	-	12	-	nC
Gate - Source charge	$Q_{gs}$		-	2.6	-	
Gate - Drain charge	$Q_{gd}$		-	1.4	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{DD} = 15V$ $I_D = 20A$ $V_{GS} = 4.5V$ $R_{G,ext} = 2\Omega$		7.9		ns
Turn-ON Rise time	$t_r$			6.3		
Turn-Off Delay time	$t_{D(off)}$			11.2		
Turn-Off Fall time	$t_f$			5.9		



Body Diode Reverse Recovery Time	trr	IF=20A, dI/dt=100A/μs	12	ns
Body Diode Reverse Recovery Charge	Qrr		21	nC

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

Fig.1 Power Dissipation

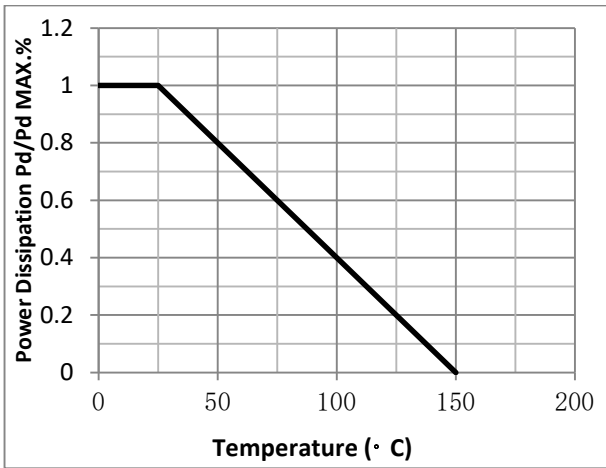


Fig.2 Typical output Characteristics

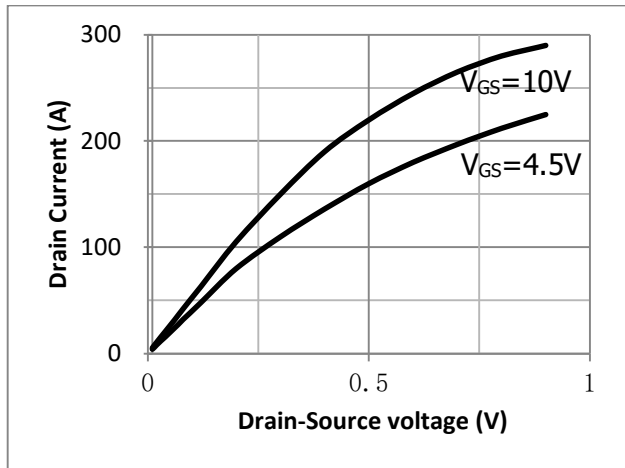


Fig.3 Threshold Voltage V.S Junction Temperature

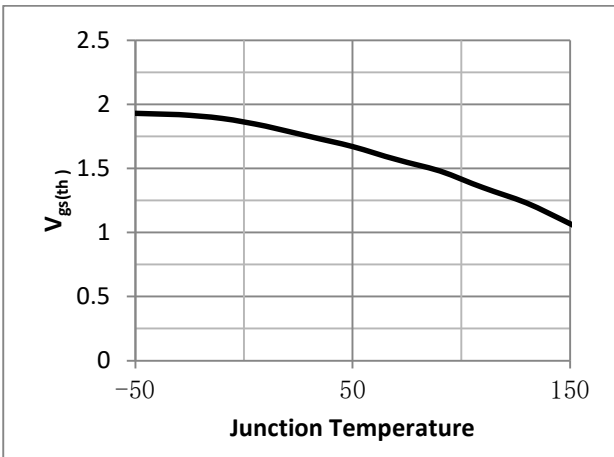


Fig.4 Resistance V.S Drain Current

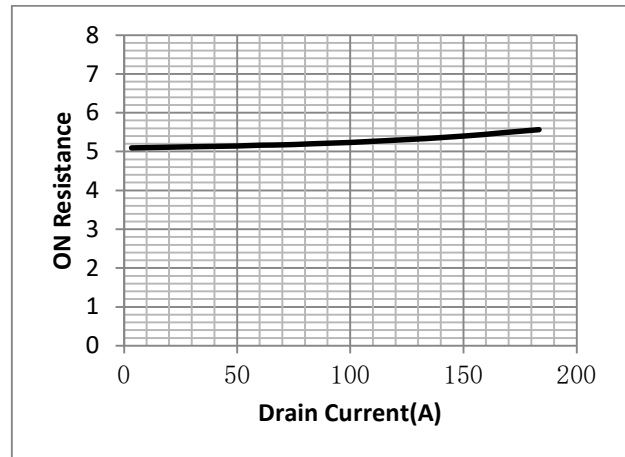




Fig.5 On-Resistance VS Gate Source Voltage

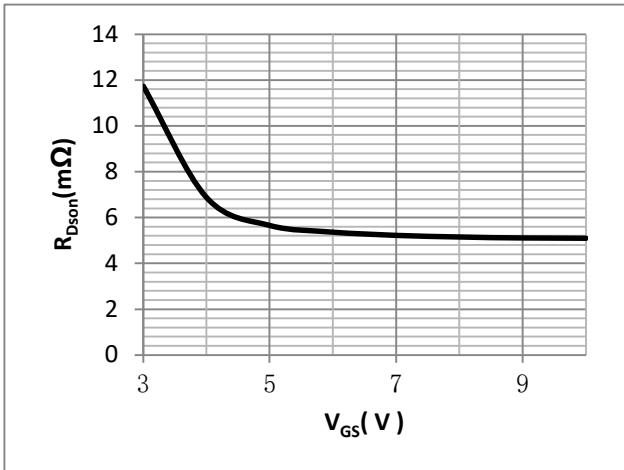


Fig.6 On-Resistance V.S Junction Temperature

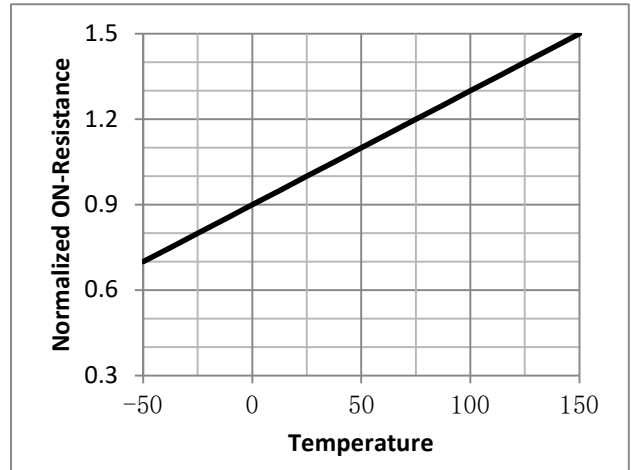


Fig.7 Gate Charge Characteristics

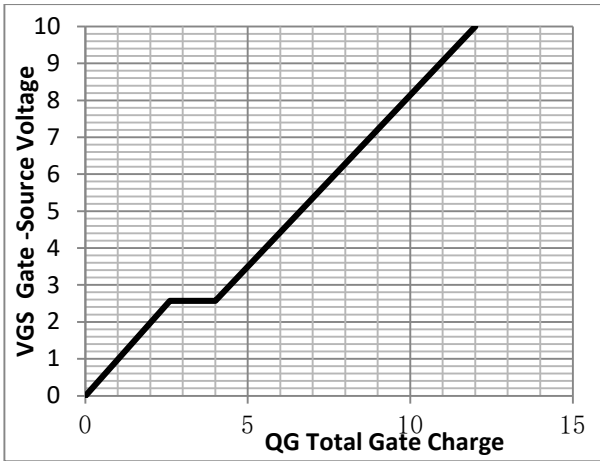


Fig.8 Capacitance vs Vds

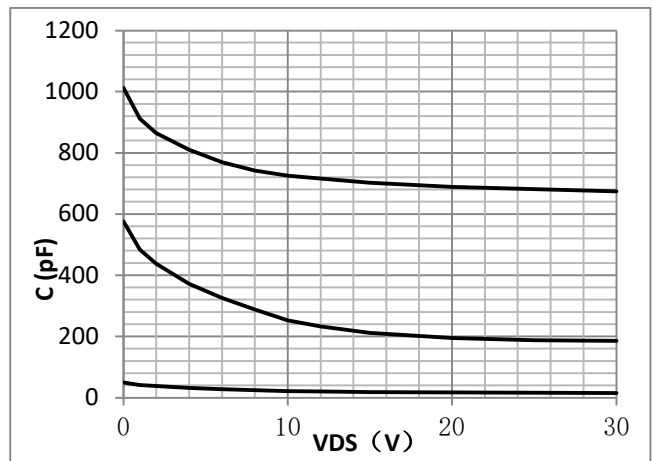


Fig.9 SOA Maximum Safe Operating Area

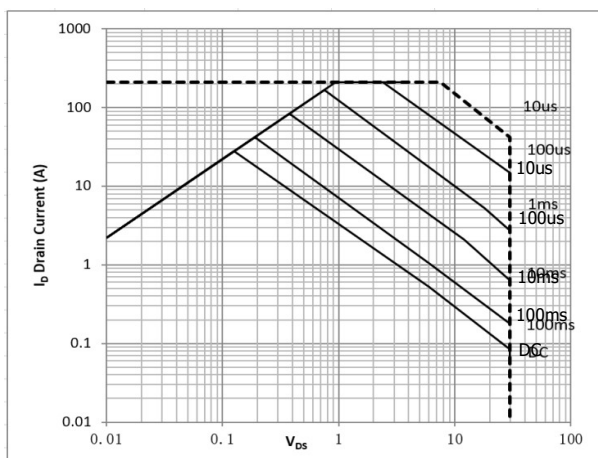


Fig.10  $I_D$ -Junction Temperature

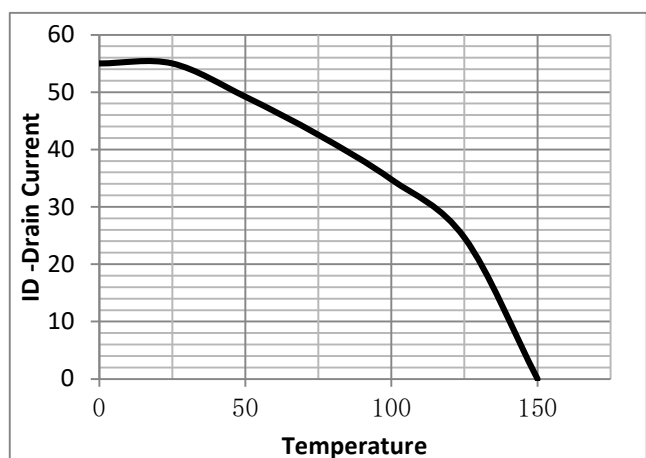


Fig.11 Gate Charge Measurement Circuit

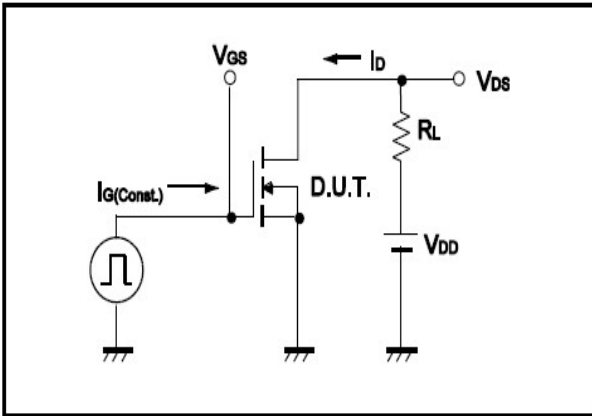


Fig.12 Gate Charge Waveform

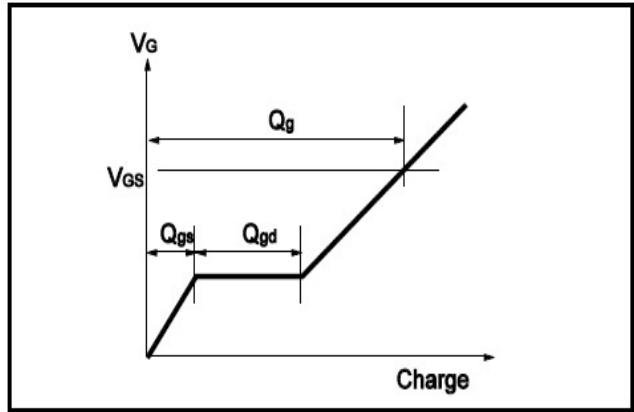


Fig.13 Resistive Switching Test Circuit

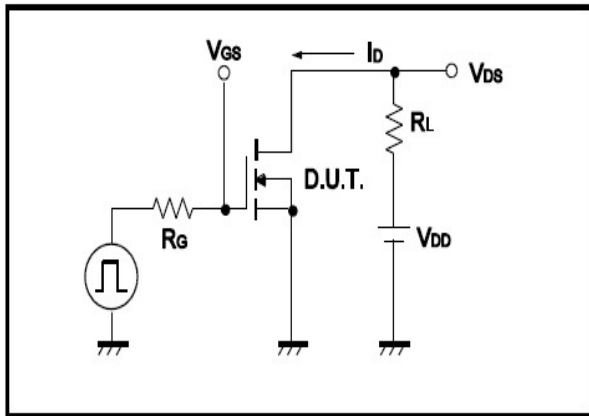


Fig.14 Resistive Switching Test Waveform

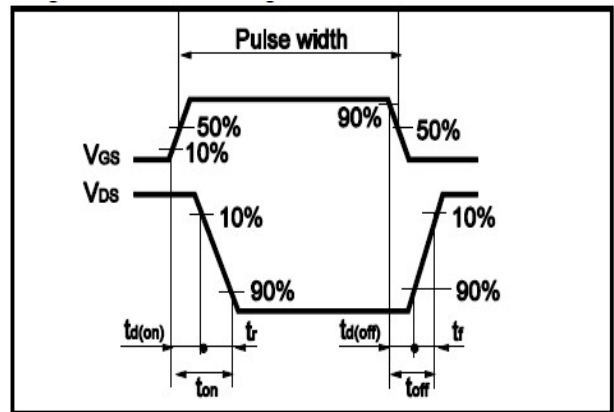


Fig.15 Avalanche Measurement Circuit

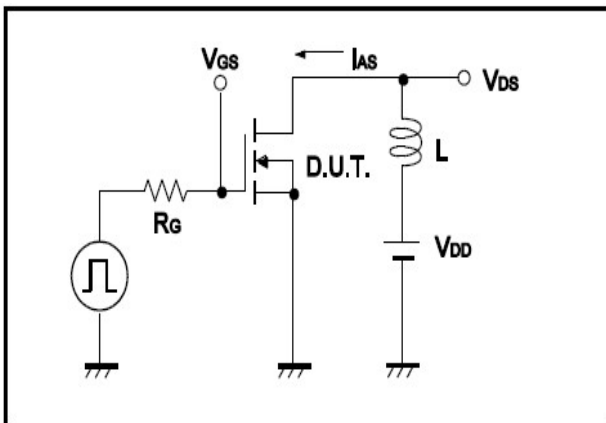
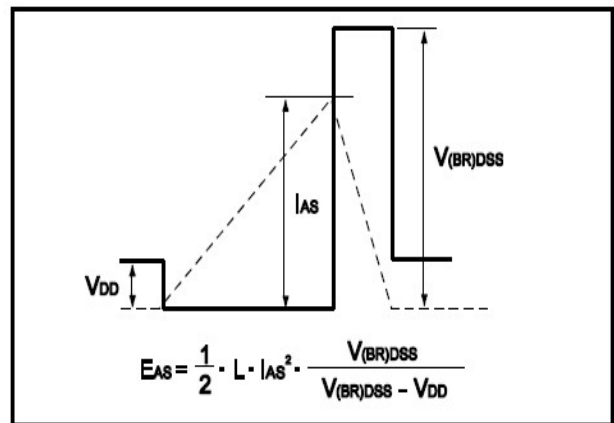


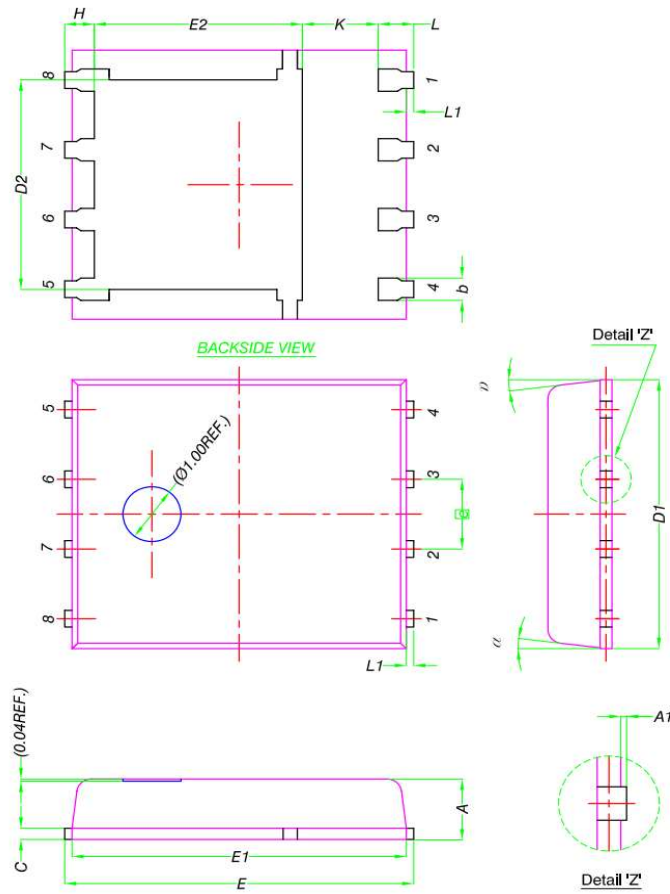
Fig.16 Avalanche Waveform





•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°