

• General Description

The ZMS040N10P combines advanced SGT MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

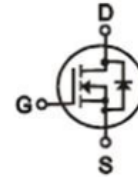
• Features

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

• Application

- Synchronous Rectification for AC-DC/DC-DC converter
- Oring switches
- Power Tools

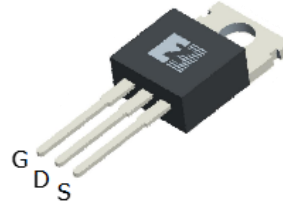
• Product Summary



$$V_{DS} = 100V$$

$$R_{DS(ON)} = 4.2m\Omega$$

$$I_D = 160A$$



TO-220

• Ordering Information:

Part NO.	ZMS040N10P
Marking	ZMS040N10
Packing Information	Bulk Tube
Basic ordering unit (pcs)	1000

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_{D@TC=25^\circ C}$	160	A
	$I_{D@TC=75^\circ C}$	121	A
	$I_{D@TC=100^\circ C}$	100	A
Pulsed Drain Current ^①	I_{DM}	480	A
Total Power Dissipation($TC=25^\circ C$)	$P_D@TC=25^\circ C$	85	W
Total Power Dissipation($TA=25^\circ C$)	$P_D@TA=25^\circ C$	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}	200	mJ
Avalanche Current@ $L=0.1mH$	I_{AS}	35	A

•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}	$V_{GS}=0V, I_D=250\mu A$	100			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.3		2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=25A$		4.2	5.2	m Ω
		$V_{GS}=4.5V, I_D=15A$		5.0	6.5	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=25V, I_D=10A$		28		s
Source-drain voltage	V_{SD}	$I_S=25A$			1.28	V

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V$ $f = 1MHz$	-	4028	-	pF
Output capacitance	C_{oss}		-	1960	-	
Reverse transfer capacitance	C_{rss}		-	44	-	

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

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q_g	$V_{DD} = 25V$	-	48	-	nC
Gate - Source charge	Q_{gs}	$I_D = 8A$	-	16	-	
Gate - Drain charge	Q_{gd}	$V_{GS} = 10V$	-	4.9	-	
Body Diode Reverse Recovery Time	t_{rr}	$I_F=20A,$ $di/dt=100A/\mu s$		TBD		nS
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F=20A,$ $di/dt=100A/\mu s$		TBD		nC

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

Fig.1 Gate-Charge Characteristics

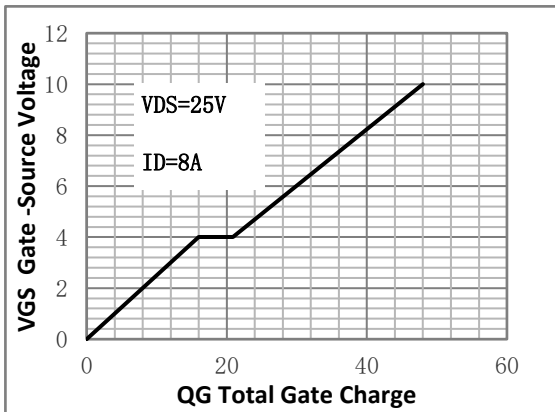


Fig.2 Capacitance Characteristics

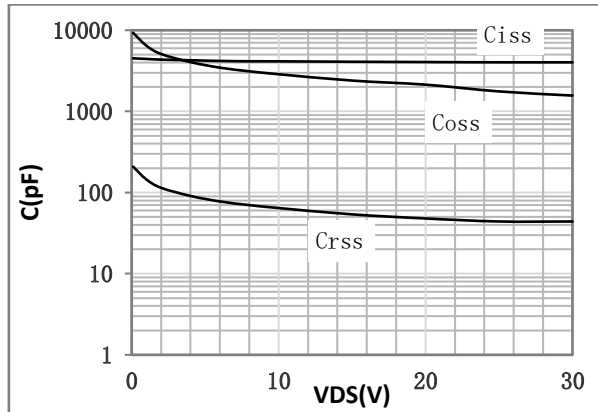


Fig.3 Power Dissipation

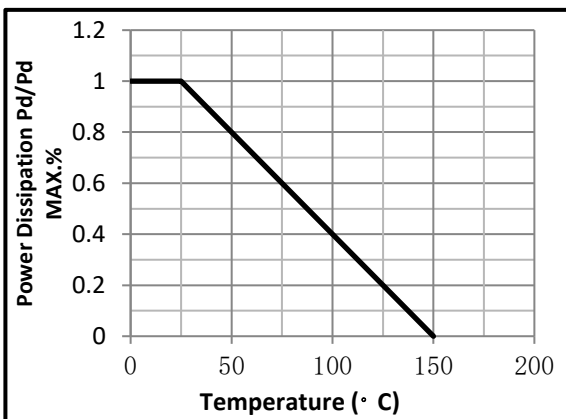


Fig.4 Typical output Characteristics

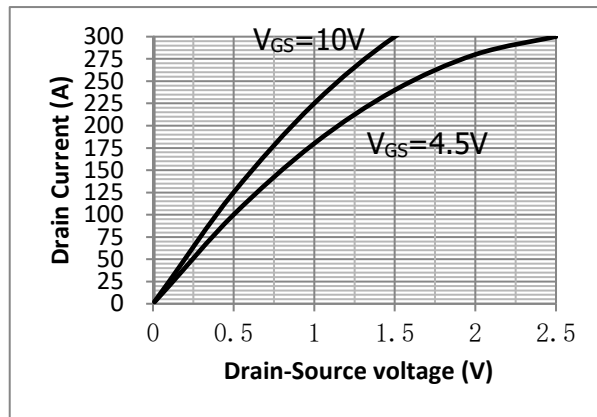


Fig.5 Threshold Voltage V.S Junction Temperature

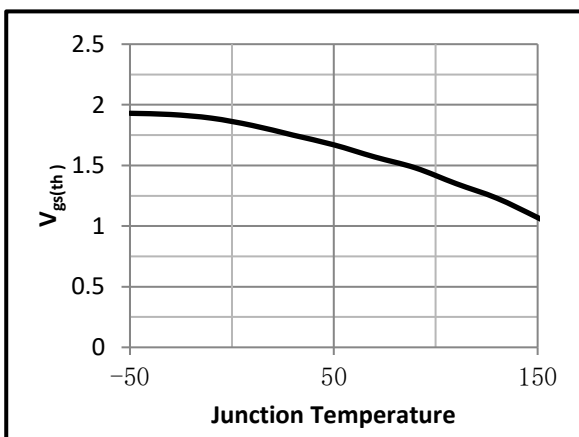


Fig.6 Resistance V.S Drain Current

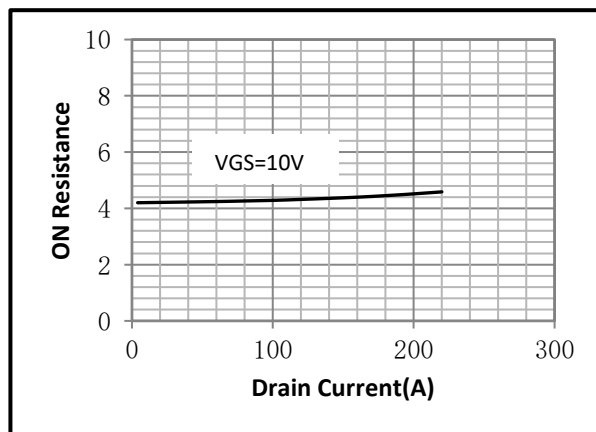


Fig.7 On-Resistance VS Gate Source Voltage

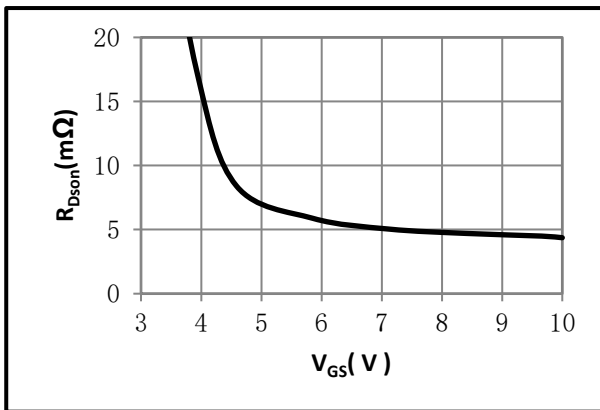


Fig.8 On-Resistance V.S Junction Temperature

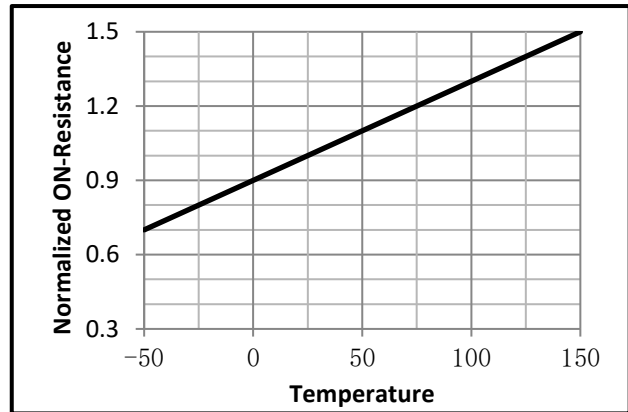


Fig.9 SOA Maximum Safe Operating Area

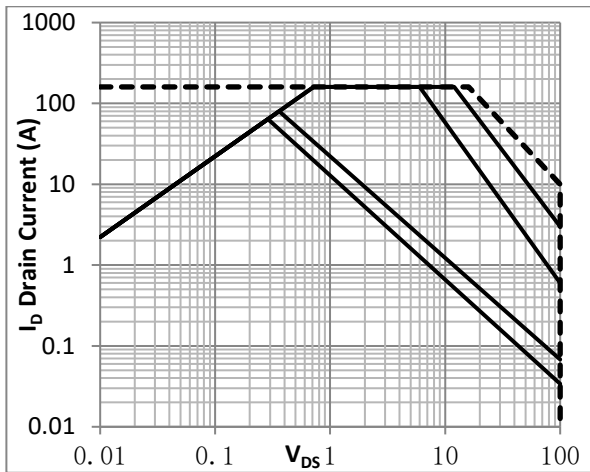


Fig.10 I_D -Junction Temperature

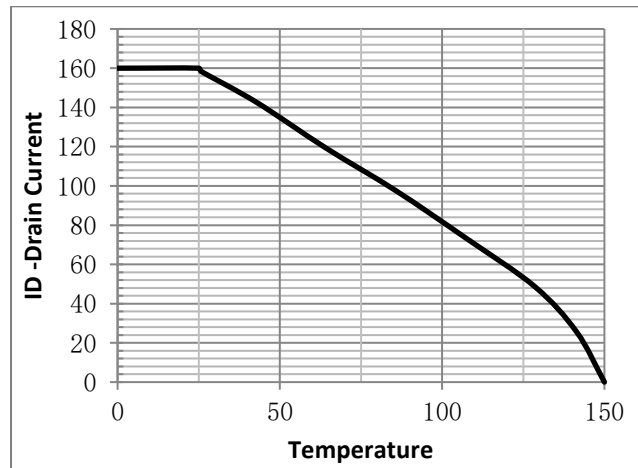


Fig.11 Gate Charge Measurement Circuit

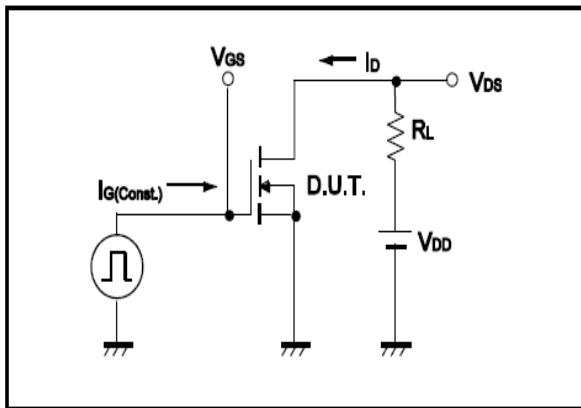


Fig.12 Gate Charge Waveform

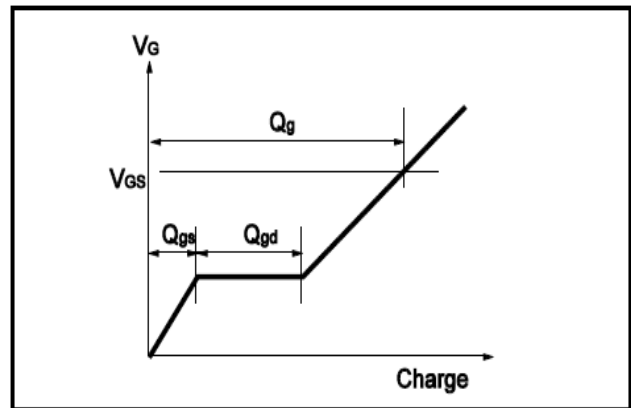


Fig.13 Switching Time Measurement Circuit

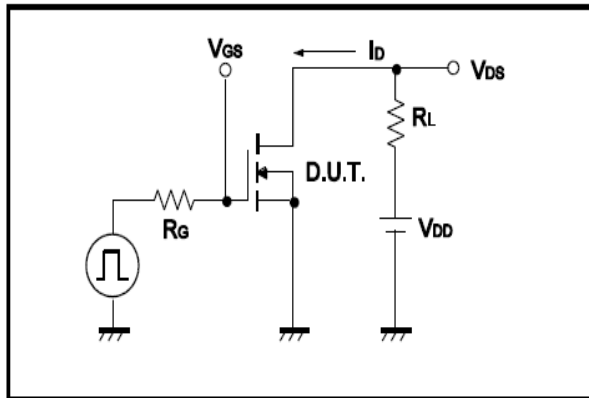


Fig.14 Switching Time Waveform

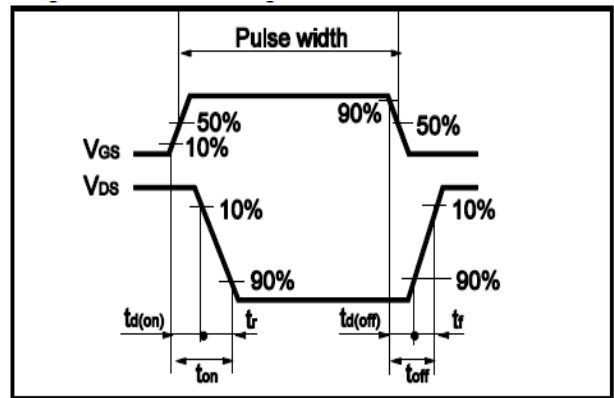


Fig.15 Avalanche Measurement Circuit

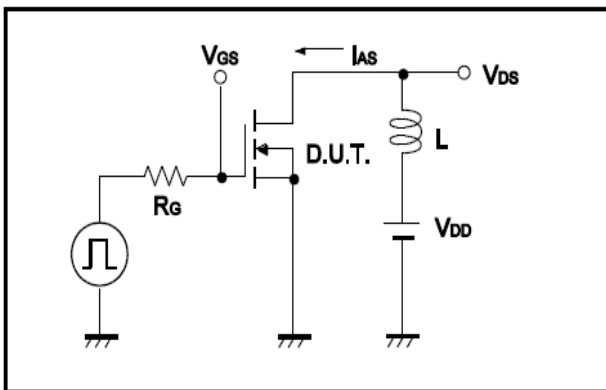
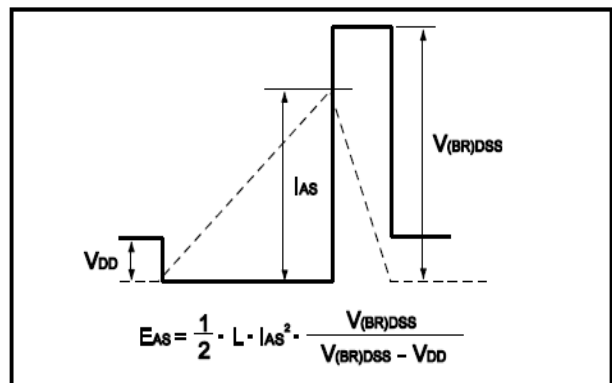


Fig.16 Avalanche Waveform



•Dimensions (TO-220)

Unit: mm

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	4.00		4.80	E	9.90		10.70
B	1.20		1.50	e		2.54	
B1	1.00		1.40	F	1.10		1.45
b1	0.65		1.00	L	12.50		14.50
c	0.35		0.75	L1	3.00	3.50	4.00
D	15.00		16.50	Q	2.50		3.00
D1	5.90		6.90	Q1	2.00		3.00
				ΦP	3.60		3.90

