

• General Description

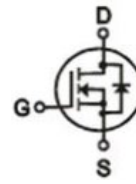
It combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

• 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

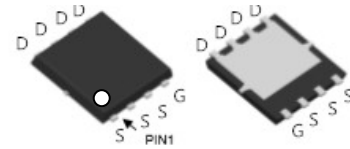
- Synchronous Rectification for AC-DC/DC-DC converter
- Oring switches
- Power Tools

• Product Summary


$V_{DS} = 100V$

$R_{DS(ON)} = 4.0m\Omega$

$I_D = 160A$


DFN5 x 6
• Ordering Information:

Part NO.	ZMS040N10N
Marking	ZMS040N10
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

• Absolute Maximum Ratings (T_C = 25°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	$P_D@TC=25^{\circ}C$	85	W
Total Power Dissipation	$P_D@TA=25^{\circ}C$	3.4	W
Operating Junction Temperature	T_J	-55 to 150	°C
Storage Temperature	T_{STG}	-55 to 150	°C
Single Pulse Avalanche Energy@L=0.1mH	E_{AS}	200	mJ

•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	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	1.2		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	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 25A @ TC = 25^\circ C$		4.0	5.2	m Ω
		$V_{GS} = 10V, I_D = 25A @ TC = 125^\circ C$		6.2		m Ω
		$V_{GS} = 4.5V, I_D = 15A @ TC = 25^\circ C$		5.0	6.5	m Ω
		$V_{GS} = 4.5V, I_D = 15A @ TC = 125^\circ C$		7.7		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

•Dynamic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$f = 1MHz,$ $V_{DS} = 25V$	-	4028	-	pF
Output capacitance	C_{oss}		-	1960	-	
Reverse transfer capacitance	C_{rss}		-	44	-	
Gate Resistance	R_g	$f = 1MHz$		3		Ω
Total gate charge	Q_g	$V_{DD} = 15V$ $I_D = 5A$ $V_{GS} = 10V$	-	48	-	nC
Gate - Source charge	Q_{gs}		-	16	-	
Gate - Drain charge	Q_{gd}		-	4.9	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS} = 10V,$		17		ns
Turn-ON Rise time	t_r	$V_{DS} = 15V$		8.5		ns

Turn-Off Delay time	$t_{D(off)}$	$R_G = 6\Omega, I_D = 15A$	45	ns
Turn-Off Fall time	t_f		9	ns
Reverse Recovery Time	t_{RR}	$V_{DD} = 20 V,$ $dI_S/dt=100A/us,$ $I_S = 30 A$	33	ns
Reverse Recovery Charge	Q_{RR}		170	nC

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

Fig.1 Gate-Charge Characteristics

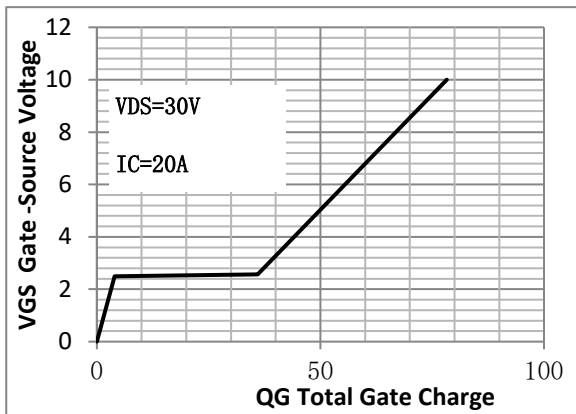


Fig.2 Capacitance Characteristics

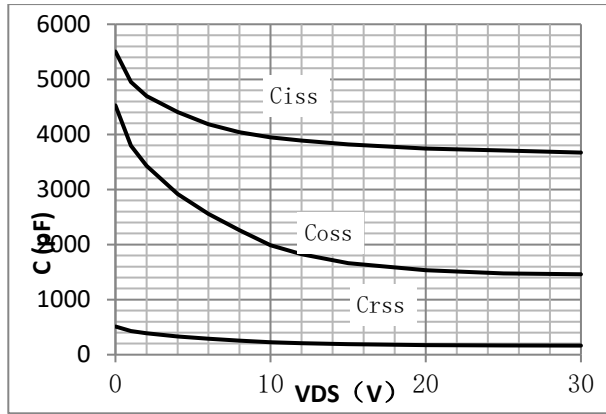


Fig.3 Power Dissipation

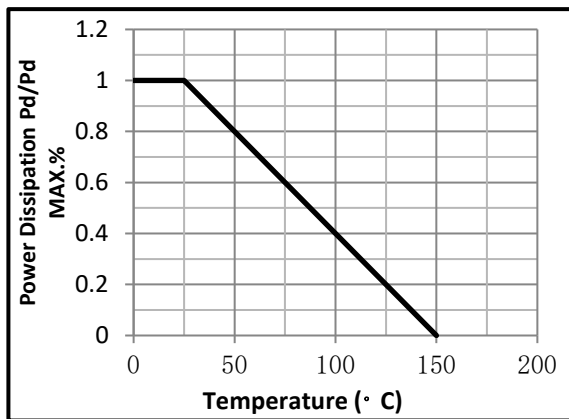


Fig.4 Typical output Characteristics

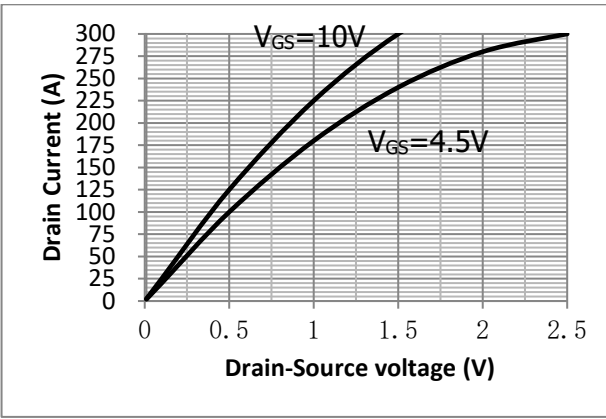


Fig.5 Threshold Voltage V.S Junction Temperature

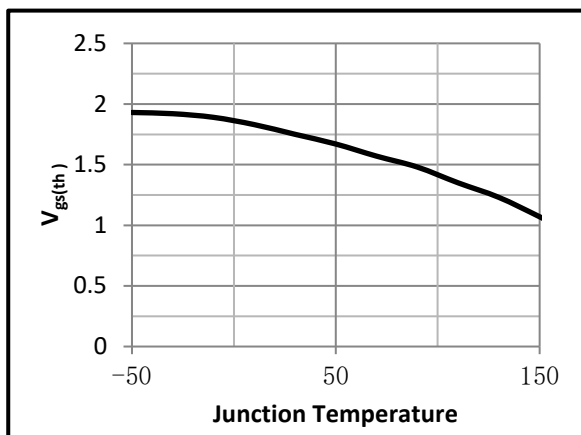


Fig.6 Resistance V.S Drain Current

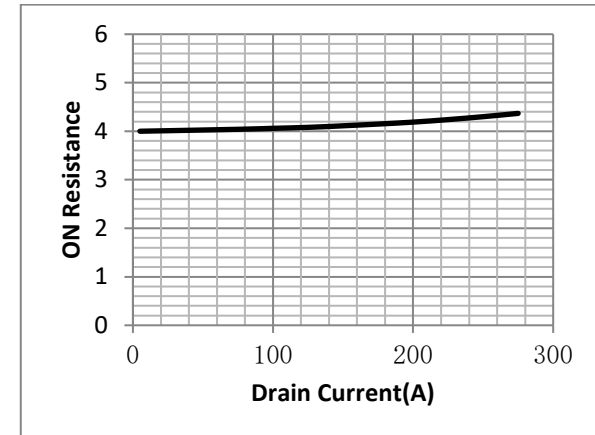


Fig.7 On-Resistance VS Gate Source Voltage

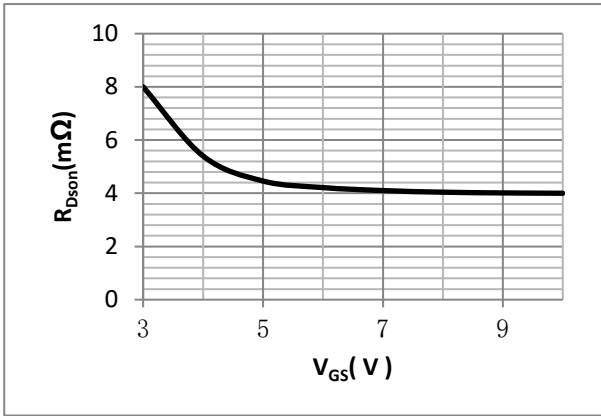


Fig.8 On-Resistance V.S Junction Temperature

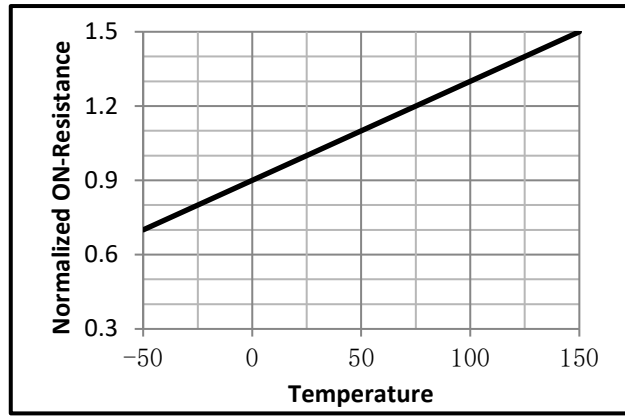


Fig.9 SOA Maximum Safe Operating Area

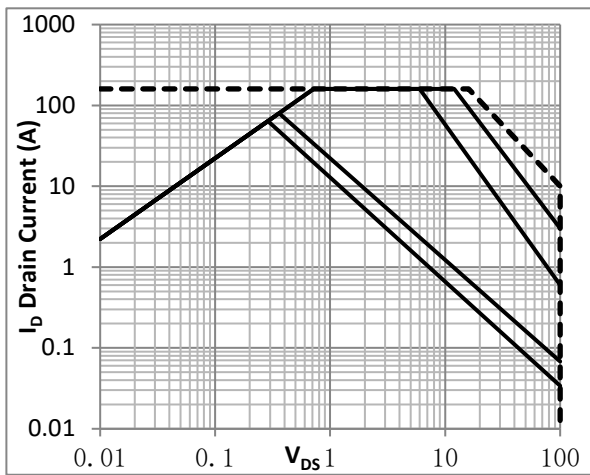


Fig.10 ID-Junction Temperature

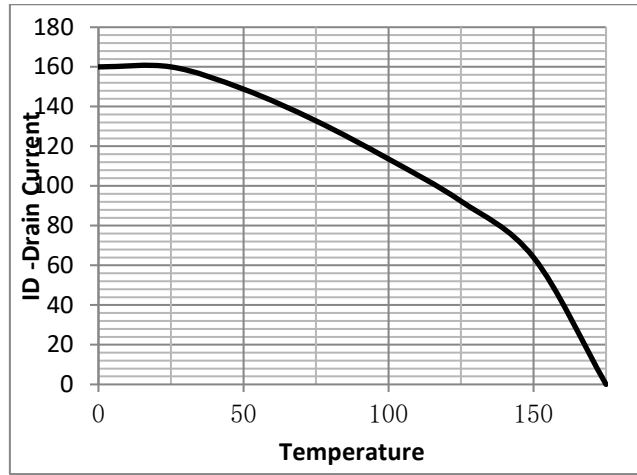


Fig.11 Switching Time Measurement Circuit

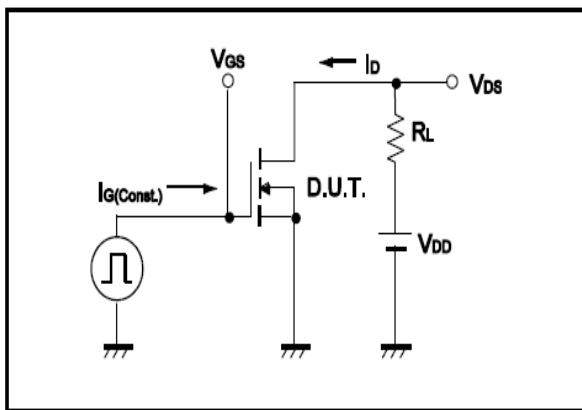


Fig.12 Gate Charge Waveform

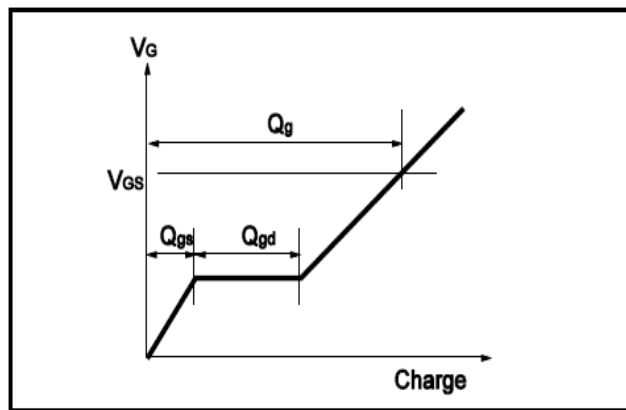


Fig.13 Switching Time Measurement Circuit

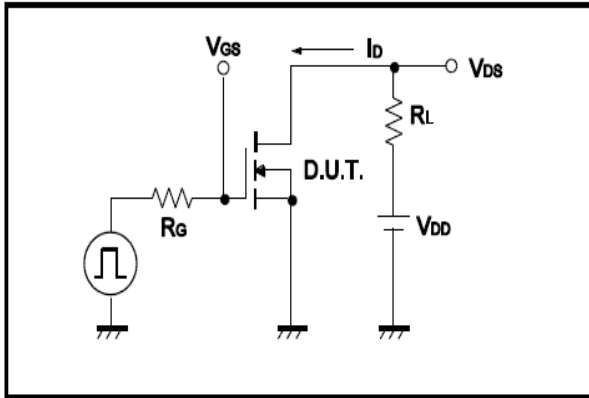


Fig.14 Gate Charge Waveform

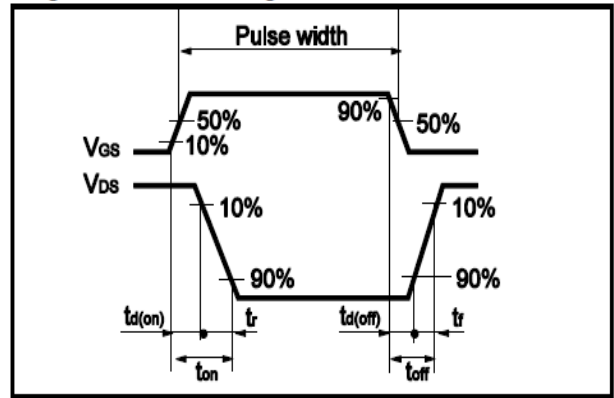


Fig.15 Avalanche Measurement Circuit

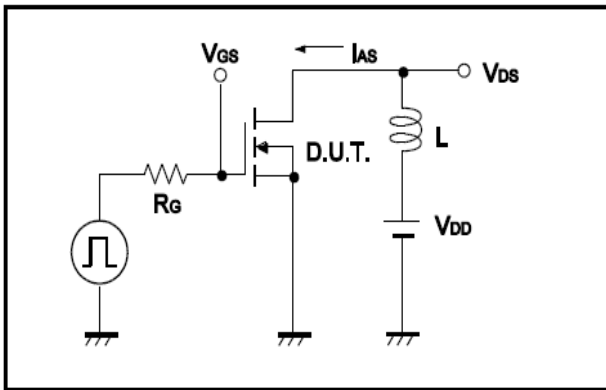
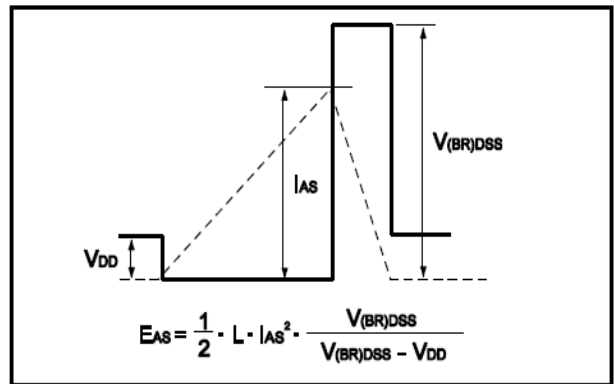


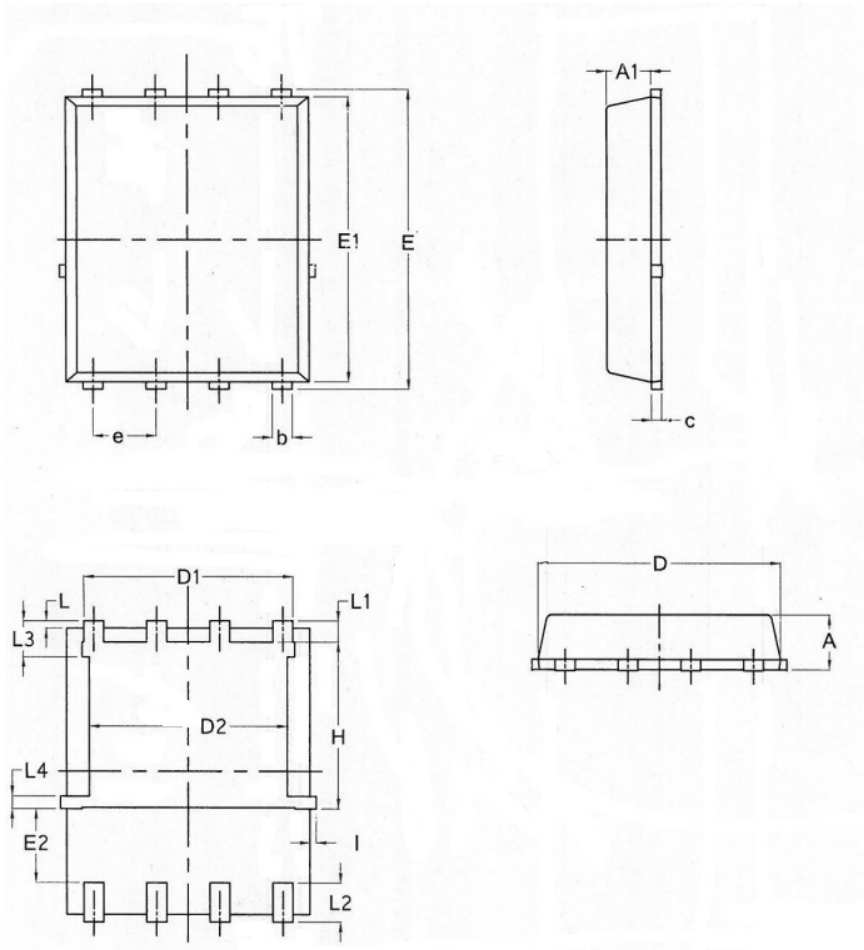
Fig.16 Avalanche Waveform





•Dimensions (DFN5×6)

Unit: mm



SYMBOL	COMMON					
	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.10	1.17	0.0354	0.0433	0.0461
A1	0.824	0.897	0.97	0.0324	0.0353	0.0382
b	0.33	0.41	0.50	0.0130	0.0161	0.0197
c	0.150	0.20	0.250	0.0059	0.0079	0.0098
D	4.80	4.90	5.00	0.1890	0.1929	0.1969
D1	3.91	4.22	4.36	0.1539	0.1661	0.1717
D2	3.85	4.00	4.15	0.1516	0.1575	0.1634
E	5.90	6.05	6.15	0.2323	0.2382	0.2421
E1	5.65	5.76	5.85	0.2224	0.2268	0.2303
E2	1.10	/	/	0.0433	/	/
e	1.27 BSC			0.050 BSC		
L	0.05	0.15	0.25	0.0020	0.0059	0.0098
L1	0.36	0.425	0.50	0.0150	0.0167	0.0197
L2	0.51	0.785	0.86	0.0201	0.0309	0.0339
L3	0.55	0.70	0.85	0.0217	0.0276	0.0335
L4	0.10	0.25	0.40	0.0039	0.0098	0.0157
H	3.25	3.35	3.58	0.1280	0.1319	0.1409
I	0	/	0.18	0	/	0.0071