

• General Description

The ZMC88403S combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. It combines one N channel MOSFET and one P channel MOSFET.

• Features

- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Dual DIE in one package

• Application

- Power Management in Notebook Computer
- BLDC Motor driver

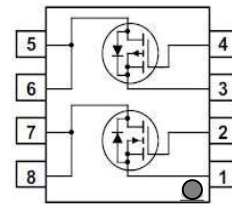
• Ordering Information:

Part NO.	ZMC88403S
Marking	ZMC88403
Packing Information	REEL TAPE
Basic ordering unit (pcs)	4000

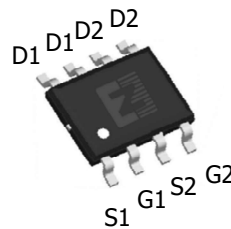
• N Channel Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current($T_C=25^\circ\text{C}$)	I_D	9	A
Pulsed Drain Current ^①	I_{DM}	18	A
Total Power Dissipation($T_C=25^\circ\text{C}$)	$P_D@T_C=25^\circ\text{C}$	2.2	W
Total Power Dissipation($T_A=25^\circ\text{C}$)	$P_D@T_A=25^\circ\text{C}$	0.69	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 to 150	$^\circ\text{C}$
Single Pulse Avalanche Energy	E_{AS}	35	mJ

• Product Summary



$V_{DS1} = 40\text{V}$
 $V_{DS2} = -40\text{V}$
 $R_{DS(ON)1} = 14\text{m}\Omega$
 $R_{DS(ON)2} = 29\text{m}\Omega$
 $I_{D1} = 9\text{A}$
 $I_{D2} = -5\text{A}$



SOP8



•P Channel Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current($T_C=25^\circ\text{C}$)	I_D	-5	A
Pulsed Drain Current ^①	I_{DM}	-10	A
Total Power Dissipation	$P_D@T_C=25^\circ\text{C}$	2.2	W
Total Power Dissipation	$P_D@T_A=25^\circ\text{C}$	0.69	W
Operating Junction Temperature	T_J	-55 to 150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 to 150	$^\circ\text{C}$
Single Pulse Avalanche Energy	E_{AS}	35	mJ

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	56	$^\circ\text{C/W}$
Thermal resistance, junction - ambient	R_{thJA}	-	-	180	$^\circ\text{C/W}$
Soldering temperature, wavesoldering for 10s	T_{sold}	-	-	265	$^\circ\text{C}$

•N Channel Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	1.2	1.6	2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 40V, V_{GS} = 0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 6A$		14	18	$m\Omega$
		$V_{GS} = 4.5V, I_D = 4A$		18	24	$m\Omega$
Forward Transconductance	g_{FS}	$V_{DS} = 25V, I_D = 5A$		2		s

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	f = 1MHz VDS=25V	-	1150	-	pF
Output capacitance	C_{oss}		-	290	-	
Reverse transfer capacitance	C_{rss}		-	205	-	

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

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Qg	$V_{DD} = 25\text{V}$ $I_D = 6\text{A}$ $V_{GS} = 10\text{V}$	-	16	-	nC
Gate - Source charge	Qgs		-	6	-	
Gate - Drain charge	Qgd		-	8	-	

•P Channel Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$	-40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\mu\text{A}$	-1.2		-2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = -40\text{V}, V_{GS} = 0\text{V}$			-1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS} = -10\text{V}, I_D = -4\text{A}$		29	36	$\text{m}\Omega$
		$V_{GS} = -4.5\text{V}, I_D = -3\text{A}$		38	49	$\text{m}\Omega$
Forward Transconductance	g_{FS}	$V_{DS} = -10\text{V}, I_D = -4\text{A}$			1.2	s

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$f = 1\text{MHz}$ $V_{DS} = -25\text{V}$	-	1250	-	pF
Output capacitance	C_{oss}		-	300	-	
Reverse transfer capacitance	C_{rss}		-	215	-	

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

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Qg	$V_{DD} = -25\text{V}$ $I_D = -8\text{A}$ $V_{GS} = -10\text{V}$	-	16	-	nC
Gate - Source charge	Qgs		-	6	-	
Gate - Drain charge	Qgd		-	8	-	

• **N Channel characteristics curve**

Fig.1 Power Dissipation Derating Curve

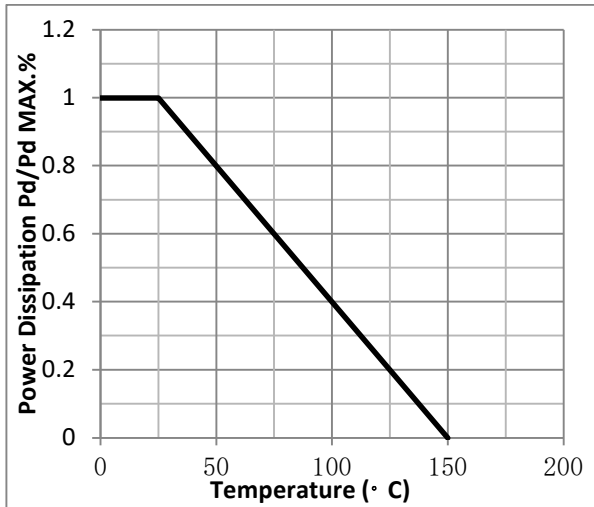


Fig.2 Typical output Characteristics

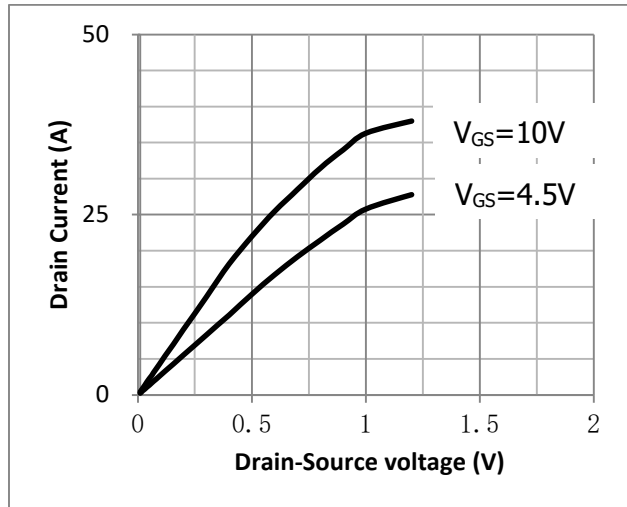


Fig.3 Threshold Voltage V.S Junction Temperature

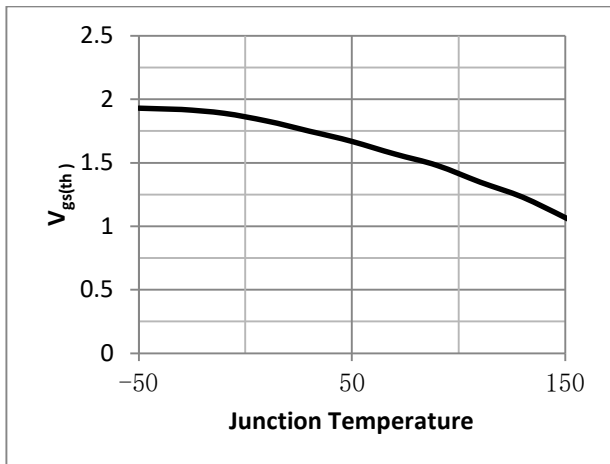


Fig.4 Resistance V.S Drain Current

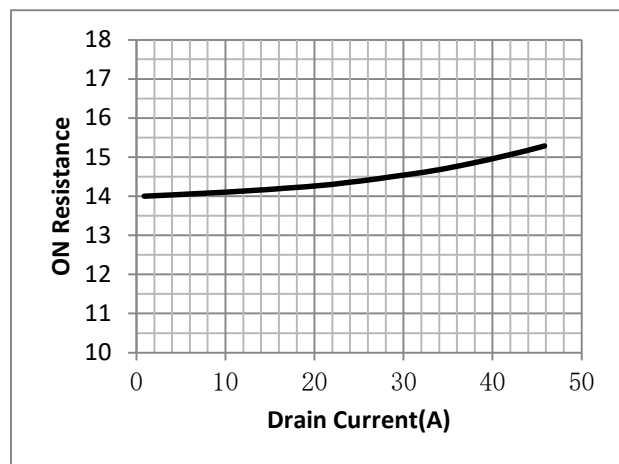


Fig.5 On-Resistance VS Gate Source Voltage

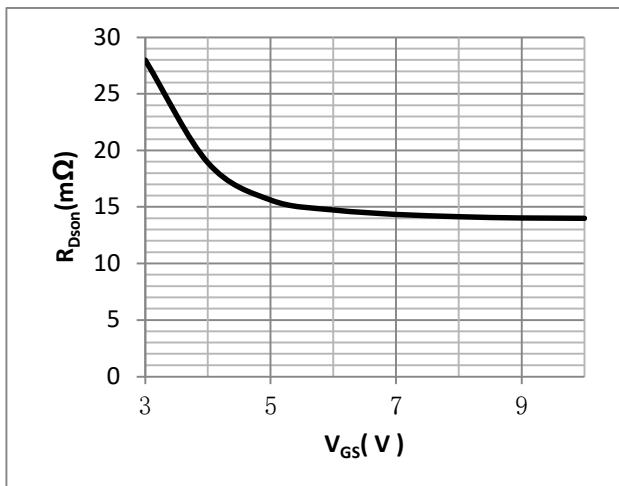
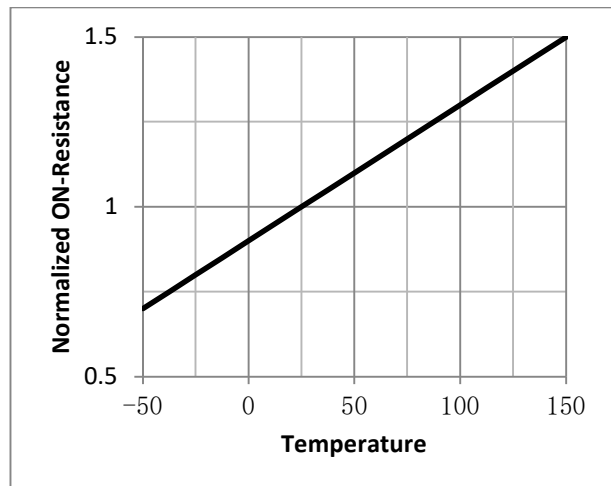


Fig.6 On-Resistance V.S Junction Temperature



•P Channel characteristics curve

Fig.1 Power Dissipation Derating Curve

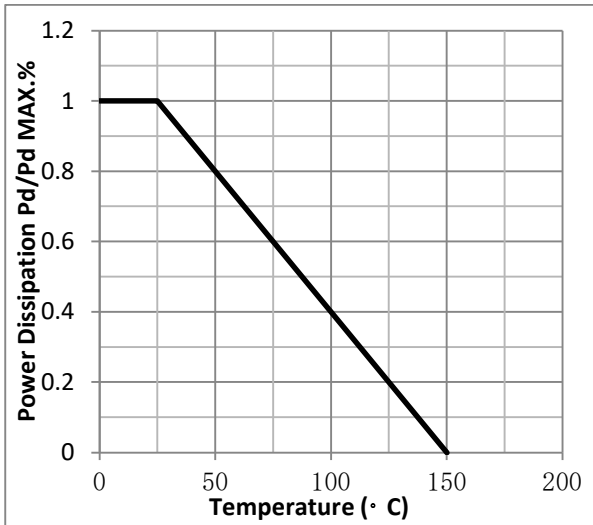


Fig.2 Typical output Characteristics

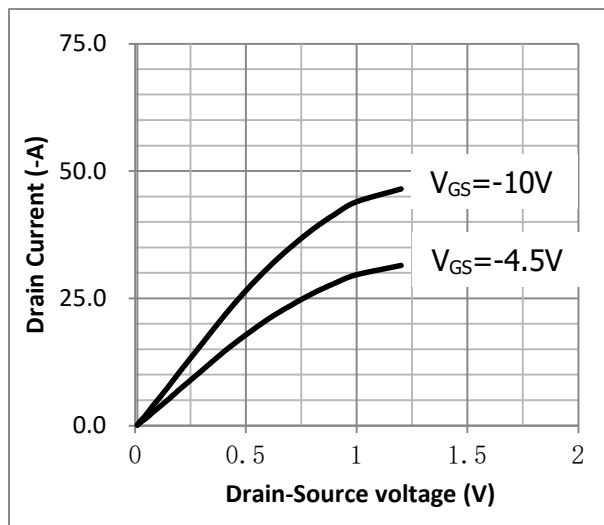


Fig.3 Threshold Voltage V.S Junction Temperature

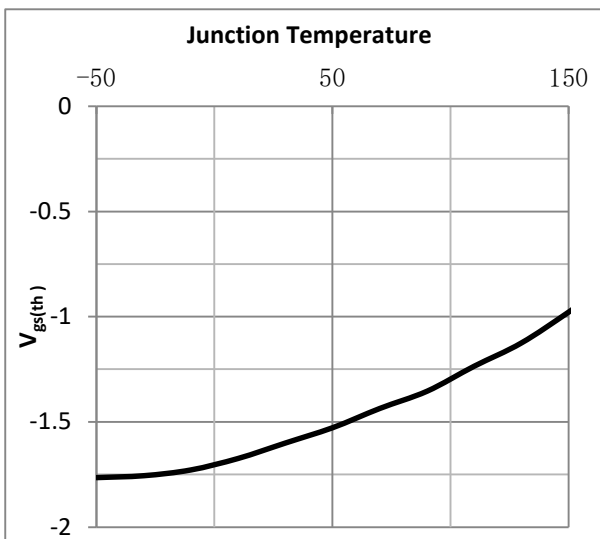


Fig.4 Resistance V.S Drain Current

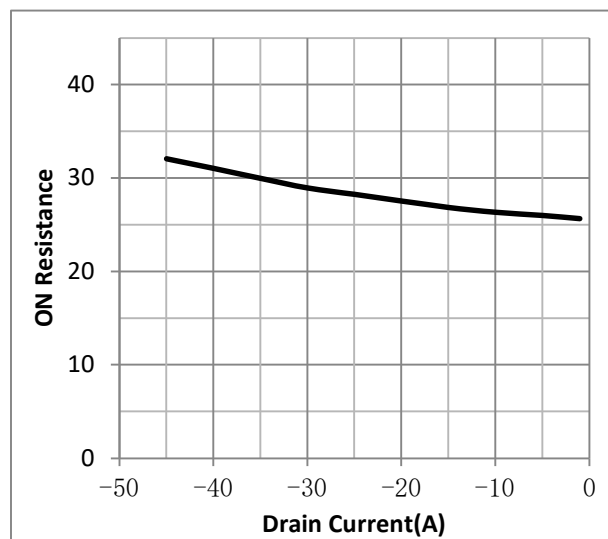


Fig.5 On-Resistance VS Gate Source Voltage

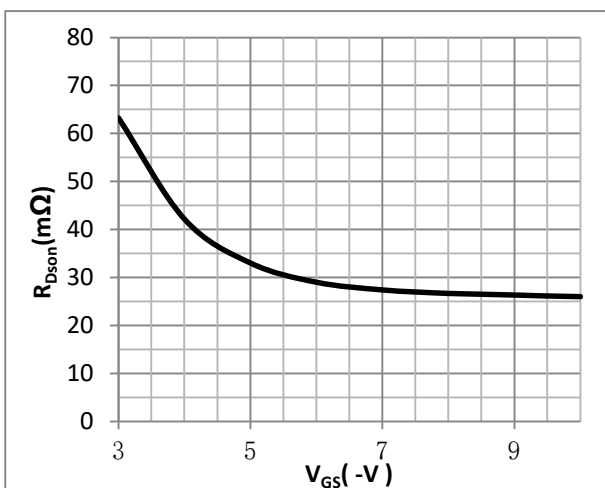
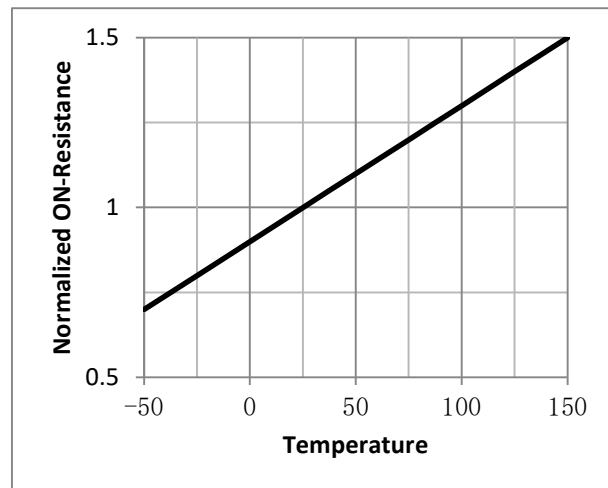


Fig.6 On-Resistance V.S Junction Temperature



•Test Circuit

Fig.1 Switching Time Measurement Circuit

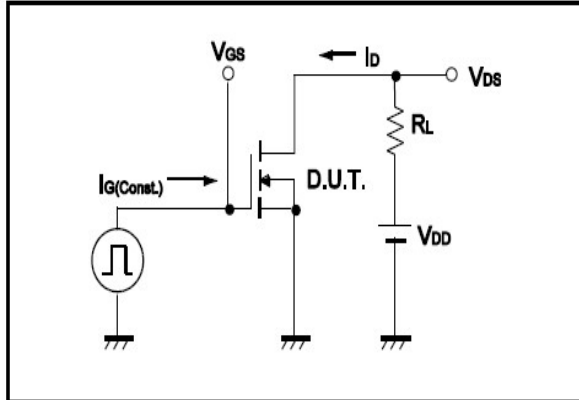


Fig.2 Gate Charge Waveform

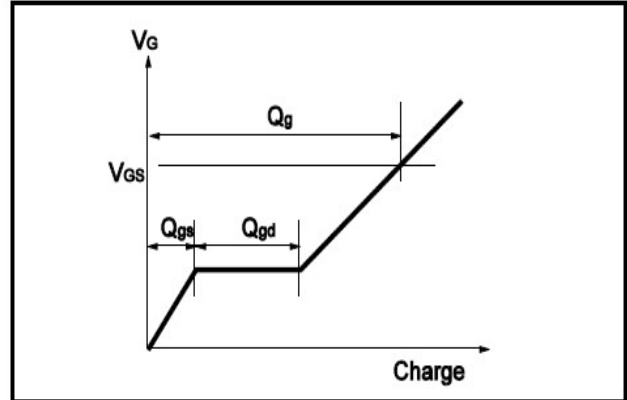


Fig.3 Switching Time Measurement Circuit

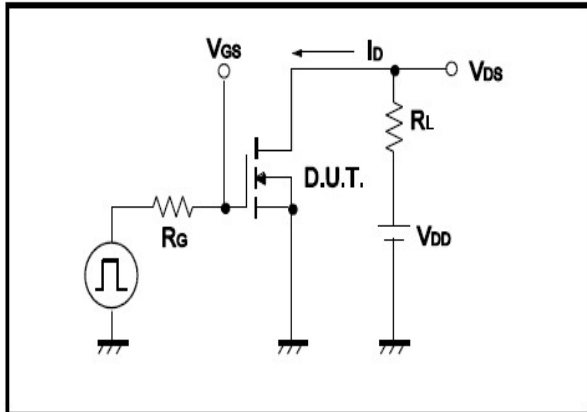


Fig.4 Gate Charge Waveform

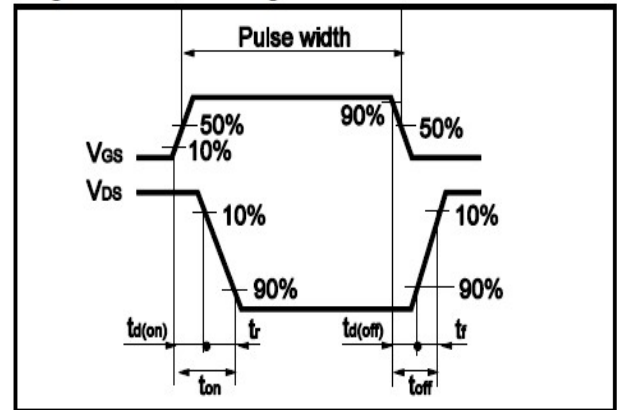


Fig.5 Avalanche Measurement Circuit

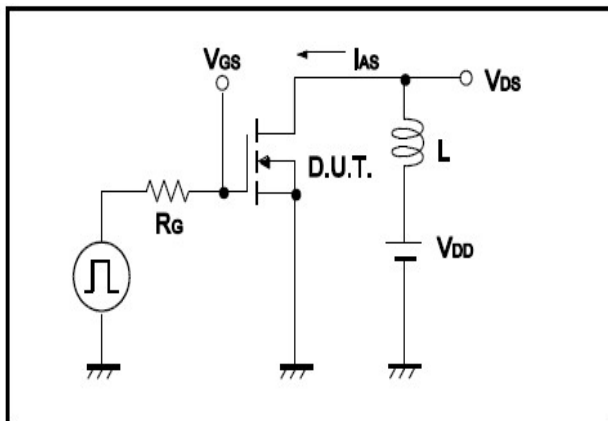
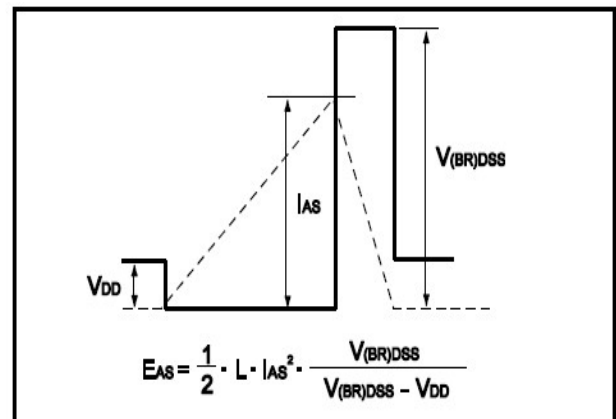


Fig.6 Avalanche Waveform



•Dimensions(SOP8)

Unit: mm

SYMBOL	min	TYP	max	SYMBOL	min		max
A	4.80		5.00	C	1.30		1.50
A1	0.37		0.47	C1	0.55		0.75
A2		1.27		C2	0.55		0.65
A3		0.41		C3	0.05		0.20
B	5.80		6.20	C4	0.19	0.20	0.23
B1	3.80		4.00	D		1.05	
B2		5.00		D1	0.40		0.62

