Alfa-MOS Technology

AFN7860S
60V N-Channel Enhancement Mode MOSFET

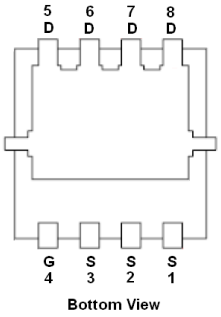
General Description

AFN7860S, N-Channel enhancement mode MOSFET, uses Advanced Trench Technology to provide excellent $R_{DS(ON)}$, low gate charge.
These devices are particularly suited for low voltage power management, such as smart phone and notebook computer and other battery powered circuits, and low in-line power loss are needed in commercial industrial surface mount applications.

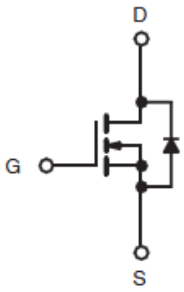
Features

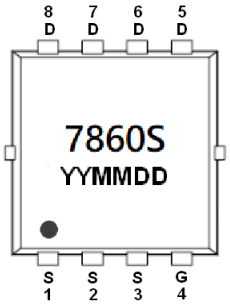
- I_D=20A,$R_{DS(ON)}$= 8.5mΩ@V_{GS}=10V
- I_D=15A,$R_{DS(ON)}$=13.5mΩ@V_{GS}=4.5V
- Super high density cell design for extremely low $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability
- DFN3.3X3.3-8L package design

Pin Description (DFN3.3X3.3-8L)



Bottom View





Top View

Application

- Primary Side Switch
- Synchronous Rectification
- DC/DC Converters
- Boost Converters
- DC/AC Inverters

Pin Define

Pin	Symbol	Description
1 ~ 3	S	Source
4	G	Gate
5 ~ 8	D	Drain

Ordering Information

Part Ordering No.	Part Marking	Package	Unit	Quantity
AFN7860SFN308RG	7860S	DFN3.3X3.3-8L	Tape & Reel	5000 EA

※ YY year code
※ MM month code
※ DD date code
※ AFN7860SFN308RG : 13”Tape & Reel ; Pb- Free ; Halogen –Free

Absolute Maximum Ratings

(T_A=25℃ Unless otherwise noted)

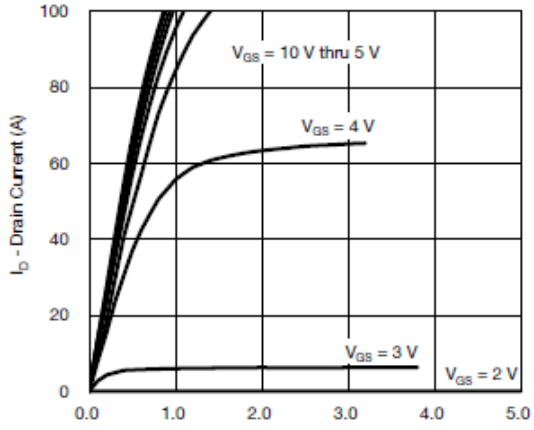
Parameter			Symbol	Typical		Unit
Drain-Source Voltage			V_{DSS}	60		V
Gate –Source Voltage			V_{GSS}	±20		V
Continuous Drain Current(T_J=150℃)	T_C=25℃	T_C=70℃	I_{DSM}	40	40	A
	T_A=25℃	T_A=70℃		15	12	
Pulsed Drain Current (t=100us)			I_{DM}	100		
Continuous Source Current(Diode Conduction)	T_C=25℃		I_S	40		
	T_A=25℃			3		
Single Pulse Avalanche Current	L=0.1mH		I_{AS}	15		
			E_{AS}	11		mJ
Power Dissipation	T_C=25℃	T_C=75℃	P_D	50	30	W
	T_A=25℃	T_A=75℃		3.7	2.4	
Operating Junction Temperature			T_J	150		℃
Storage Temperature Range			T_{STG}	-55/150		℃
Thermal Resistance-Junction to Ambient	t ≤ 10 s		$R_{\theta JA}$	26		℃/W
Maximum Junction-to-Case (Drain)	Steady-State		$R_{\theta JA}$	1.9		

Electrical Characteristics

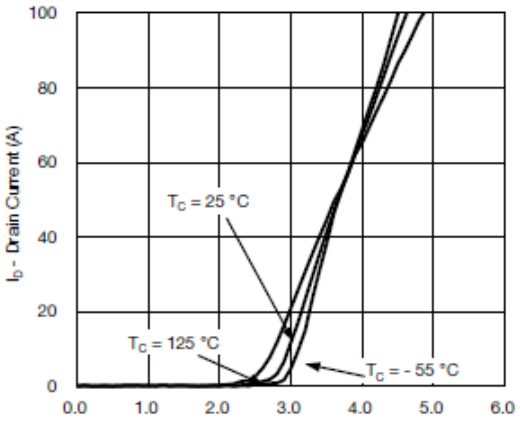
(T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=250uA	60			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	1.0		2.5	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=48V,V_{GS}=0V			1	uA
		V_{DS}=48V,V_{GS}=0V T_J=85℃			10	
On-State Drain Current	$I_{D(on)}$	V_{DS}≧5V,V_{GS}=10V	30			A
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}=10V,I_D=20A		7.3	8.5	mΩ
		V_{GS}=4.5V,I_D=15A		11	13.5	
Forward Transconductance	g_{FS}	V_{DS}=15V,I_D=20A		60		S
Diode Forward Voltage	V_{SD}	I_S=5A,V_{GS}=0V		0.75	1.2	V
Dynamic						
Total Gate Charge	Q_g	V_{DS}=30V,V_{GS}=4.5V I_D≡10A		8	15	nC
Gate-Source Charge	Q_{gs}			4		
Gate-Drain Charge	Q_{gd}			2		
Gate Resistance	R_g	f=1MHz	0.4	1.7	3.4	Ω
Input Capacitance	C_{iss}	V_{DS}=30V,V_{GS}=0V f=1MHz		1350		pF
Output Capacitance	C_{oss}			545		
Reverse Transfer Capacitance	C_{rss}			35		
Turn-On Time	$t_{d(on)}$	V_{DD}=30V,R_L=3Ω I_D≡10A,V_{GEN}=10V R_G=1Ω		12	24	ns
	t_r			5	10	
Turn-Off Time	$t_{d(off)}$			20	40	
	t_f			5	10	

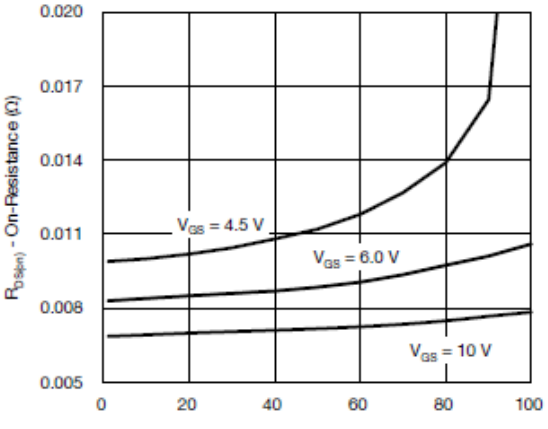
Typical Characteristics



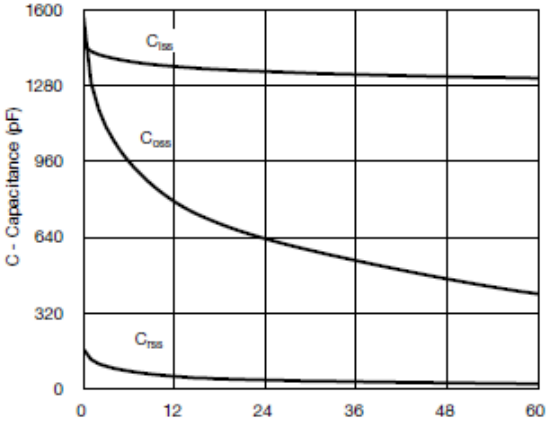
Output Characteristics



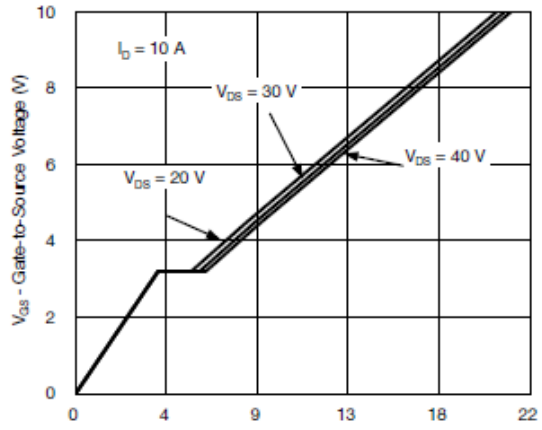
Transfer Characteristics



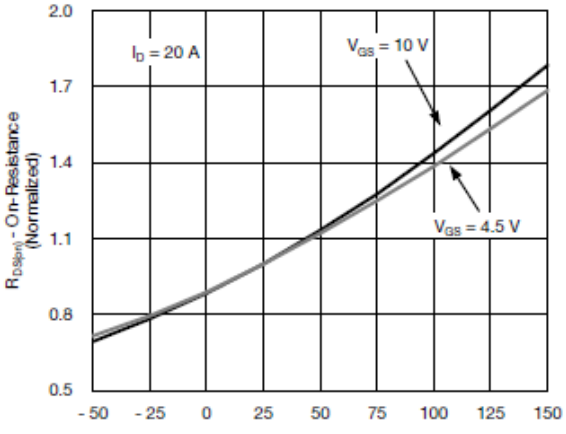
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

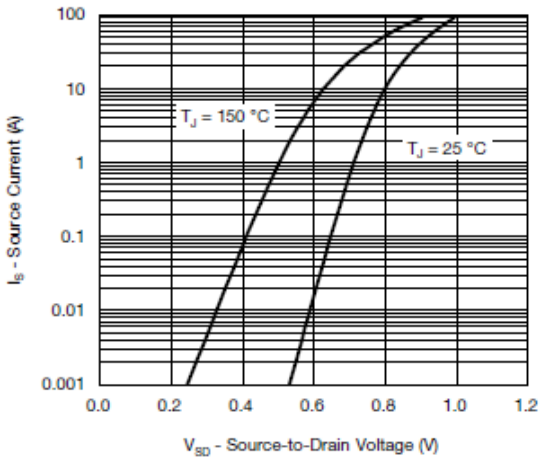


Gate Charge

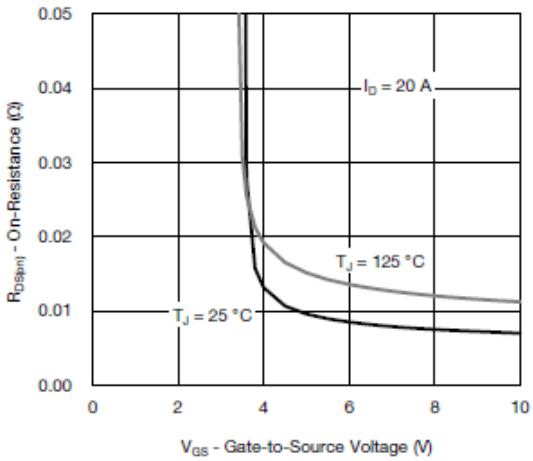


On-Resistance vs. Junction Temperature

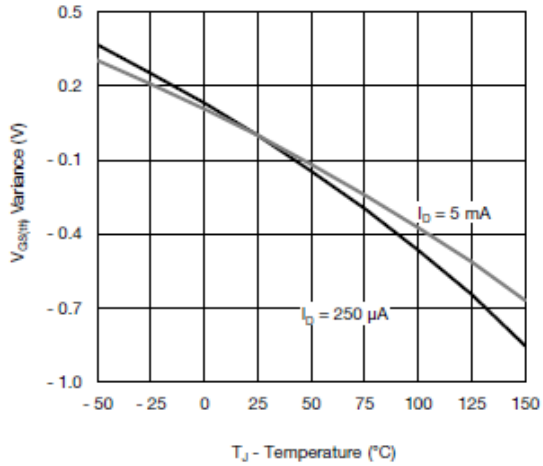
Typical Characteristics



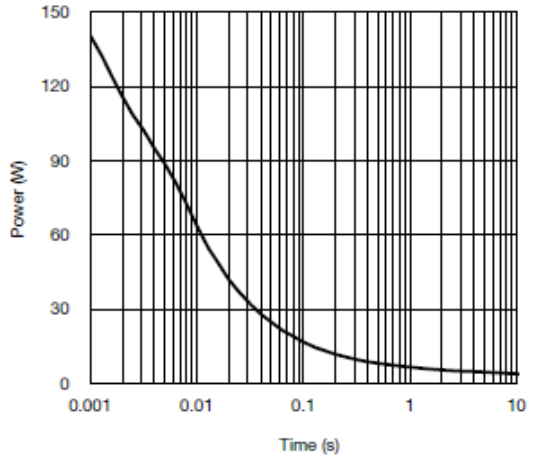
Source-Drain Diode Forward Voltage



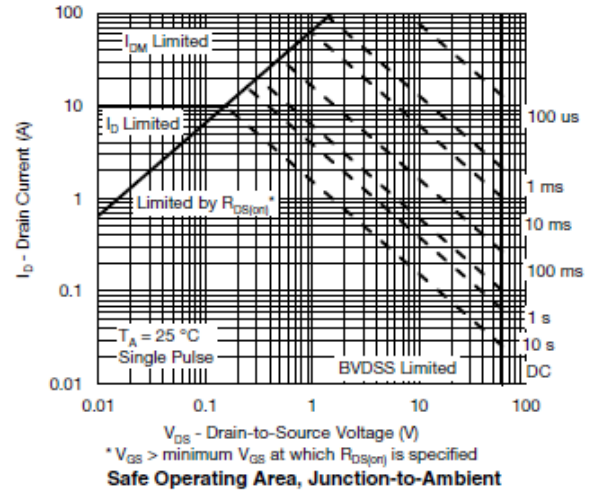
On-Resistance vs. Gate-to-Source Voltage



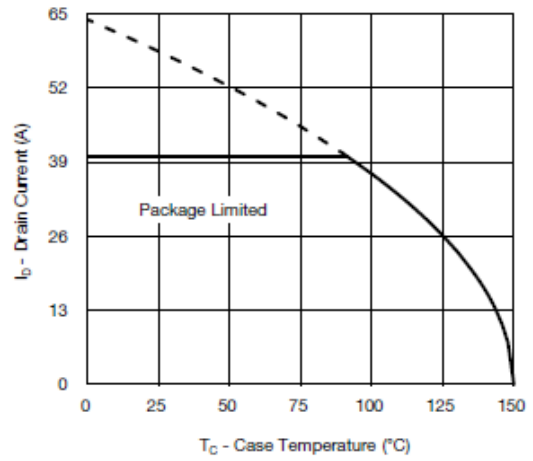
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

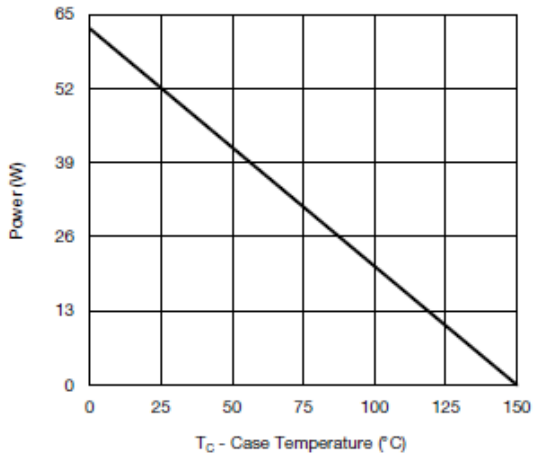


Safe Operating Area, Junction-to-Ambient

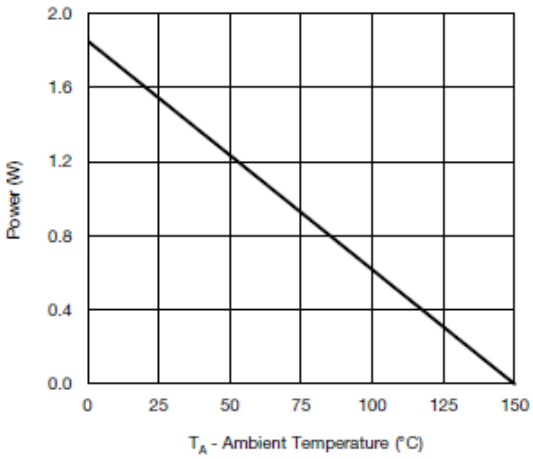


Current Derating*

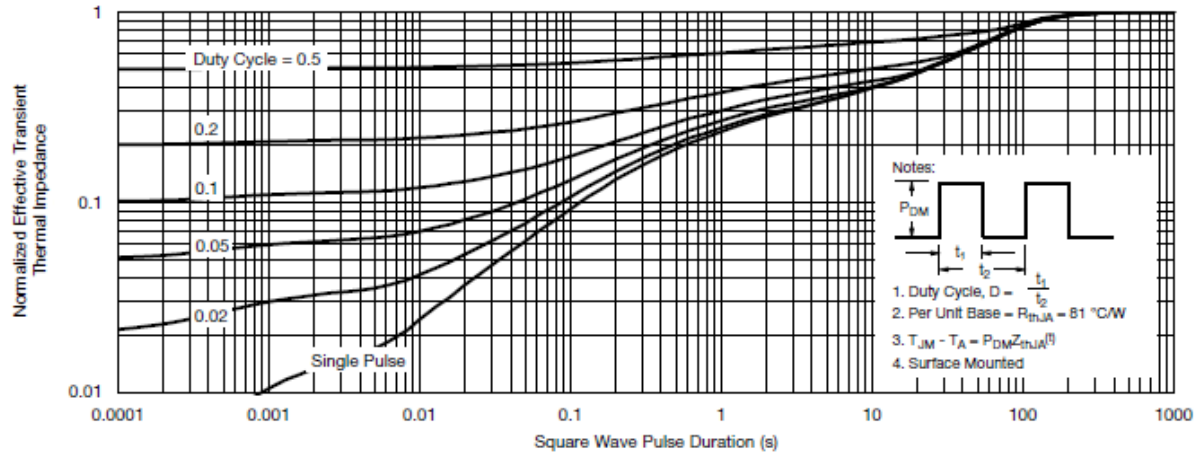
Typical Characteristics



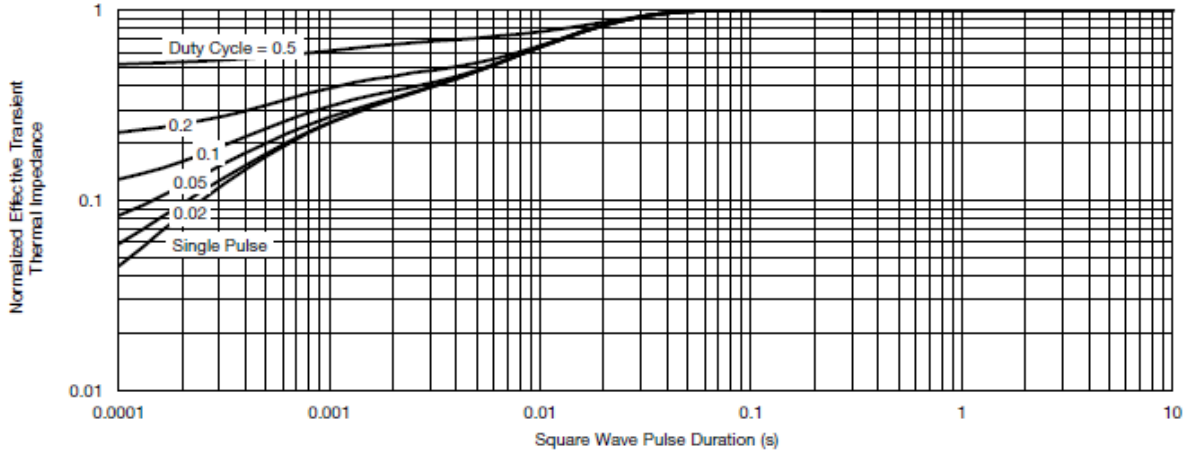
Power, Junction-to-Case



Power, Junction-to-Ambient



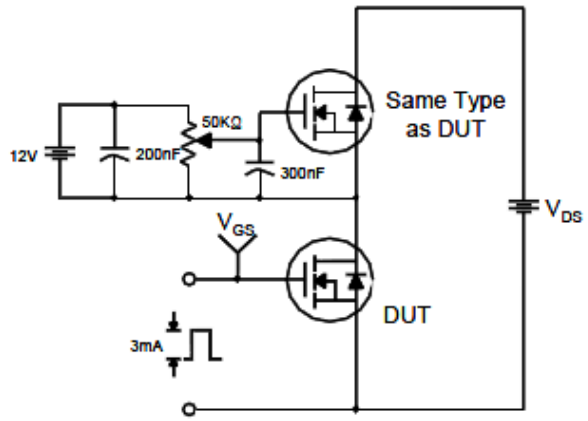
Normalized Thermal Transient Impedance, Junction-to-Ambient

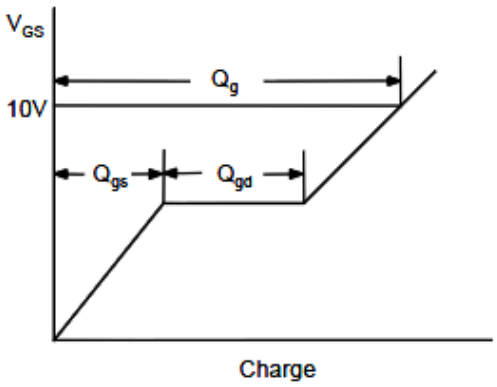


Normalized Thermal Transient Impedance, Junction-to-Case

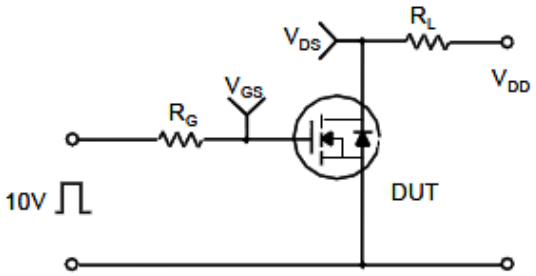
Typical Characteristics

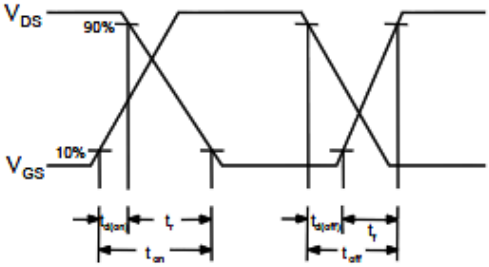
Gate Charge Test Circuit & Waveform



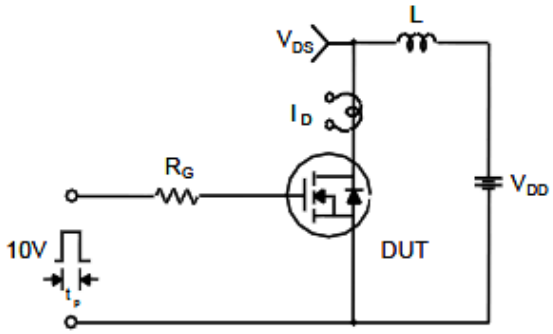


Resistive Switching Test Circuit & Waveforms

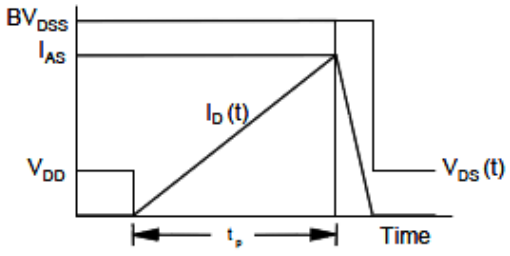




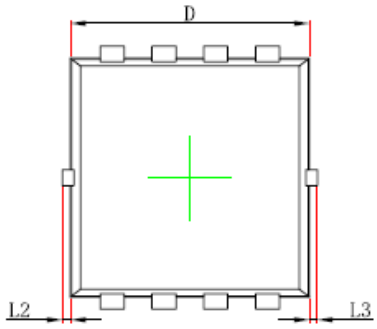
Unclamped Inductive Switching Test Circuit & Waveforms



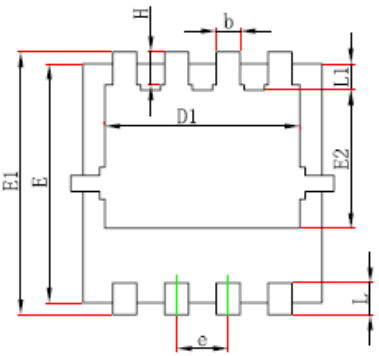
$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



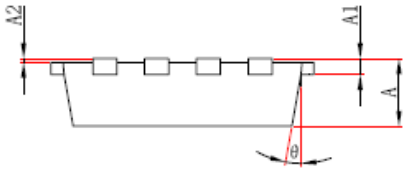
Package Information (DFN3.3X3.3-8L)



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152 REF.		0.006 REF.	
A2	0~0.05		0~0.002	
D	2.900	3.100	0.114	0.122
D1	2.300	2.600	0.091	0.102
E	2.900	3.100	0.114	0.122
E1	3.150	3.450	0.124	0.136
E2	1.535	1.935	0.060	0.076
b	0.200	0.400	0.008	0.016
e	0.550	0.750	0.022	0.030
L	0.300	0.500	0.012	0.020
L1	0.180	0.480	0.007	0.019
L2	0~0.100		0~0.004	
L3	0~0.100		0~0.004	
H	0.315	0.515	0.012	0.020
θ	9°	13°	9°	13°

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