

General Description

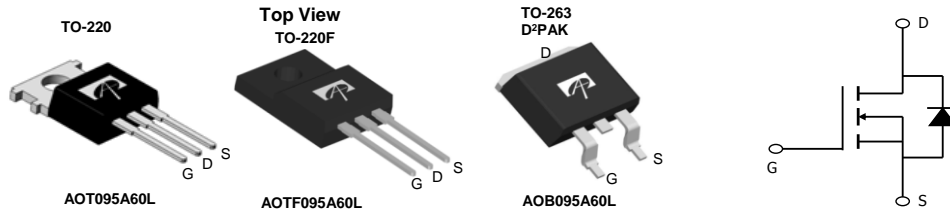
- Proprietary α MOS5™ technology
- Low $R_{DS(ON)}$
- Optimized switching parameters for better EMI performance
- Enhanced body diode for robustness and fast reverse recovery

Applications

- SMPS with PFC, Flyback and LLC topologies
- Micro inverter with DC/AC inverter topology

Product Summary

$V_{DS} @ T_{j,max}$	700V
I_{DM}	152A
$R_{DS(ON),max}$	< 0.095 Ω
$Q_{g,typ}$	78nC
$E_{oss} @ 400V$	7.8 μ J

 100% UIS Tested
 100% R_g Tested


Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOTF095A60L	TO-220F Green	Tube	1000
AOT095A60L	TO-220 Green	Tube	1000
AOB095A60L	TO-263 Green	Tape&Reel	800

Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	AOT(B)095A60L	AOTF095A60L	Units
Drain-Source Voltage	V_{DS}	600		V
Gate-Source Voltage	V_{GS}	± 20		V
Gate-Source Voltage (dynamic) AC($f > 1\text{Hz}$)	V_{GS}	± 30		V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	38	38*
		$T_C=100^\circ\text{C}$	24	24*
Pulsed Drain Current ^C	I_{DM}	152		A
Avalanche Current ^C	I_{AR}	11		A
Repetitive avalanche energy ^C	E_{AR}	60		mJ
Single pulsed avalanche energy ^G	E_{AS}	480		mJ
MOSFET dv/dt ruggedness	dv/dt	100		V/ns
Diode reverse recovery $V_{DS}=0$ to 400V, $I_F \leq 20\text{A}$, $T_j=25^\circ\text{C}$	dv/dt	20		V/ns
	di/dt	500		A/us
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	378	41
		Derate above 25 $^\circ\text{C}$	3.0	0.3
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150		$^\circ\text{C}$
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	T_L	300		$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	AOT(B)095A60L	AOTF095A60L	Units
Maximum Junction-to-Ambient ^{A,D}	$R_{\theta JA}$	65	65	$^\circ\text{C/W}$
Maximum Case-to-sink ^A	$R_{\theta CS}$	0.5	--	$^\circ\text{C/W}$
Maximum Junction-to-Case	$R_{\theta JC}$	0.33	3	$^\circ\text{C/W}$

* Drain current limited by maximum junction temperature.

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V, T _J =25°C	600			V
		I _D =250μA, V _{GS} =0V, T _J =150°C		700		
BV _{DSS} /ΔT _J	Breakdown Voltage Temperature Coefficient	I _D =250μA, V _{GS} =0V		0.51		V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =600V, V _{GS} =0V			1	μA
		V _{DS} =480V, T _J =125°C			10	
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =5V, I _D =250μA		3		V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =19A		0.082	0.095	Ω
g _{FS}	Forward Transconductance	V _{DS} =10V, I _D =19A		25		S
V _{SD}	Diode Forward Voltage	I _S =19A, V _{GS} =0V		0.86	1.2	V
I _S	Maximum Body-Diode Continuous Current				38	A
I _{SM}	Maximum Body-Diode Pulsed Current ^C				152	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =100V, f=1MHz		4010		pF
C _{oss}	Output Capacitance			105		pF
C _{o(er)}	Effective output capacitance, energy related ^H	V _{GS} =0V, V _{DS} =0 to 480V, f=1MHz		90		pF
C _{o(tr)}	Effective output capacitance, time related ^I			390		pF
C _{riss}	Reverse Transfer Capacitance	V _{GS} =0V, V _{DS} =100V, f=1MHz		1.2		pF
R _g	Gate resistance	f=1MHz		5.5		Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =480V, I _D =19A		78		nC
Q _{gs}	Gate Source Charge			28		nC
Q _{gd}	Gate Drain Charge			24		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =400V, I _D =19A, R _G =5Ω		48		ns
t _r	Turn-On Rise Time			50		ns
t _{D(off)}	Turn-Off DelayTime			99		ns
t _f	Turn-Off Fall Time			33		ns
t _{rr}	Body Diode Reverse Recovery Time			444		ns
I _{rm}	Peak Reverse Recovery Current	I _F =19A, di/dt=100A/μs, V _{DS} =400V		36		A
Q _{rr}	Body Diode Reverse Recovery Charge			11.5		μC

A. The value of R_{θJA} is measured with the device in a still air environment with T_A=25° C.

B. The power dissipation P_D is based on T_{J(MAX)}=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150° C. Ratings are based on low frequency and duty cycles to keep initial T_J=25° C.

D. The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.

G. L=60mH, I_{AS}=4 A, R_G=25Ω, Starting T_J=25° C.

H. C_{o(er)} is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{(BR)DSS}.

I. C_{o(tr)} is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{(BR)DSS}.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

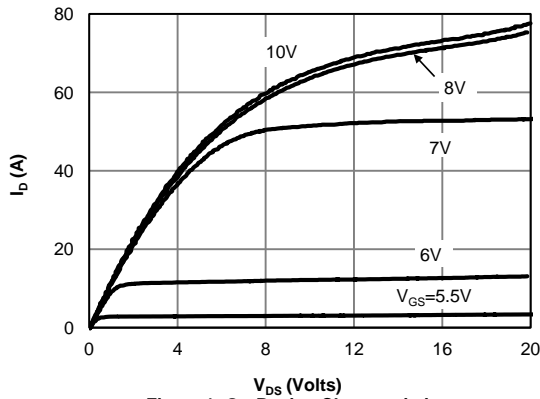


Figure 1: On-Region Characteristics

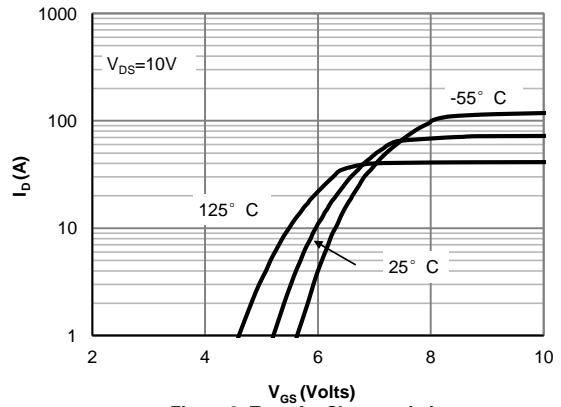


Figure 2: Transfer Characteristics

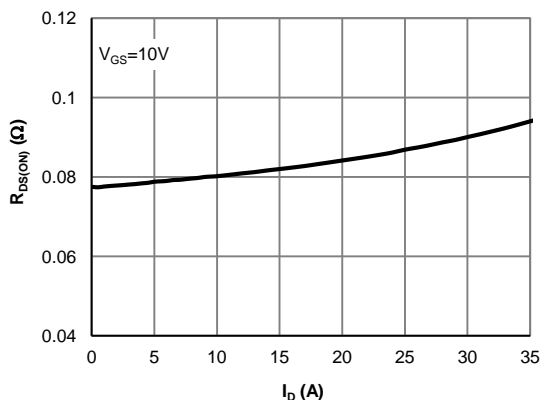


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

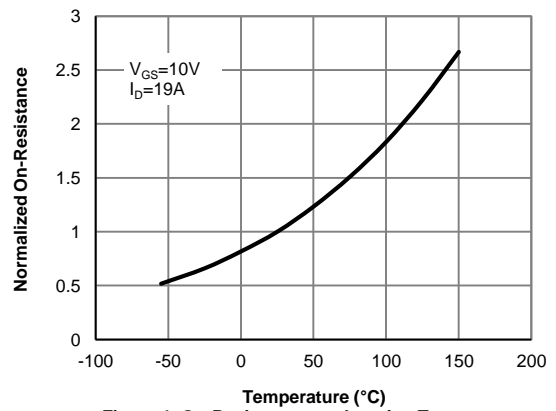


Figure 4: On-Resistance vs. Junction Temperature

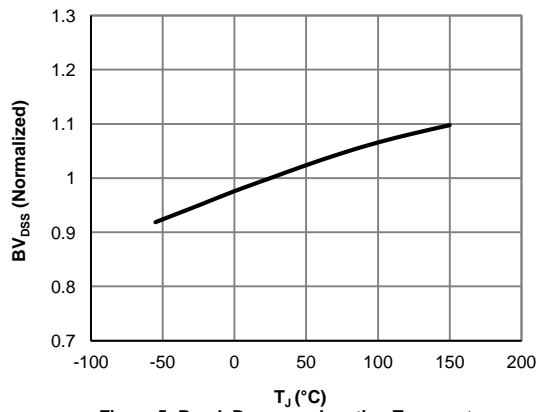


Figure 5: Break Down vs. Junction Temperature

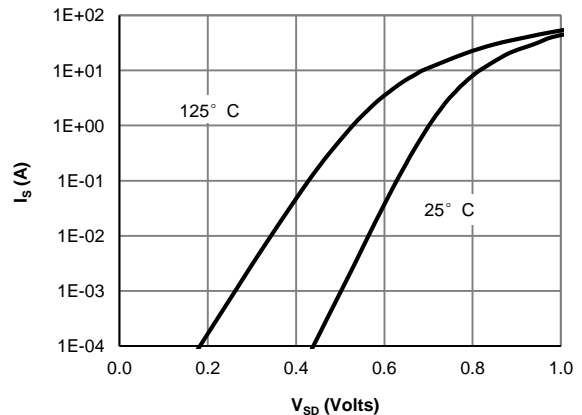


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

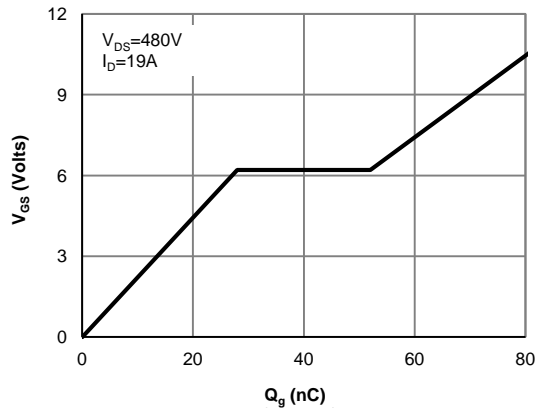


Figure 7: Gate-Charge Characteristics

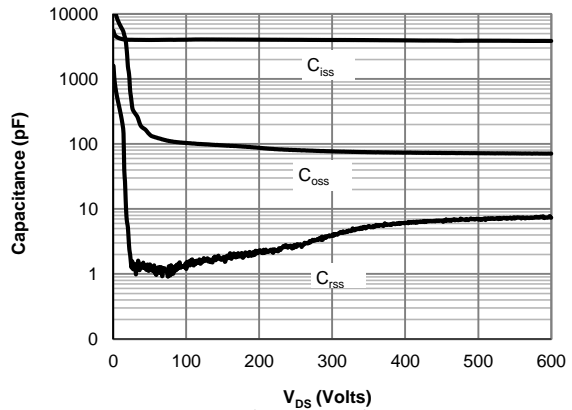


Figure 8: Capacitance Characteristics

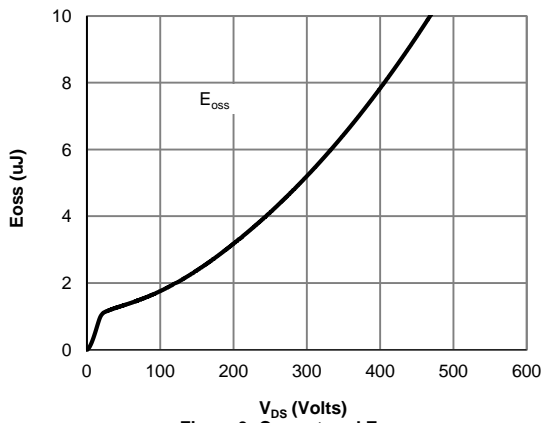


Figure 9: Coss stored Energy

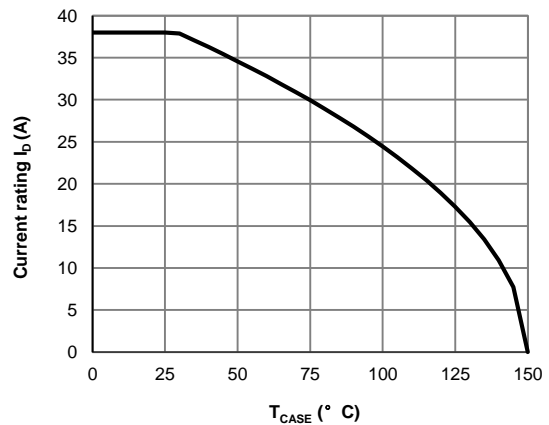


Figure 10: Current De-rating (Note F)

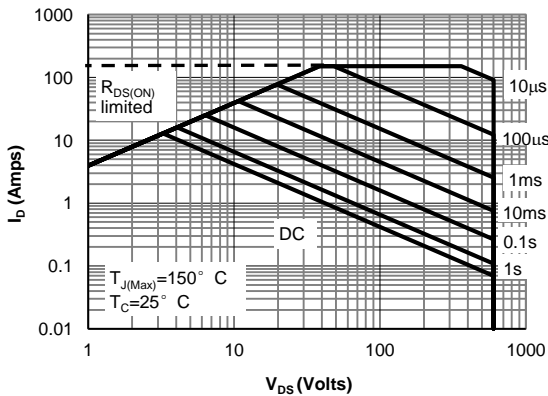


Figure 11: Maximum Forward Biased Safe Operating Area for AOTF095A60L (Note F)

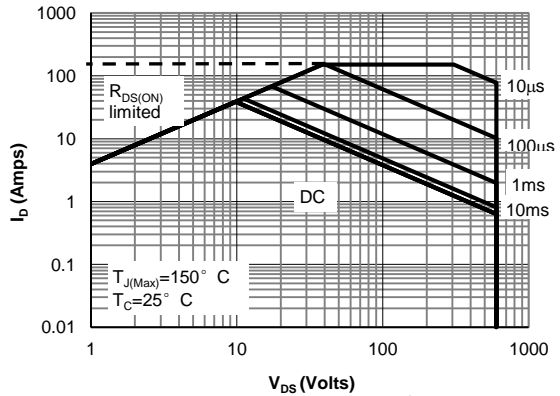


Figure 12: Maximum Forward Biased Safe Operating Area for AOT(B)095A60L (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

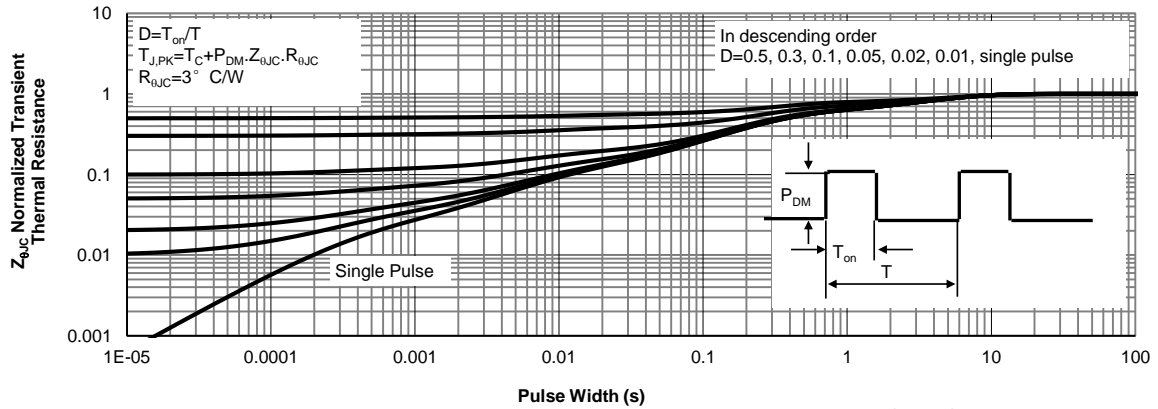


Figure 13: Normalized Maximum Transient Thermal Impedance for AOTF095A60L (Note F)

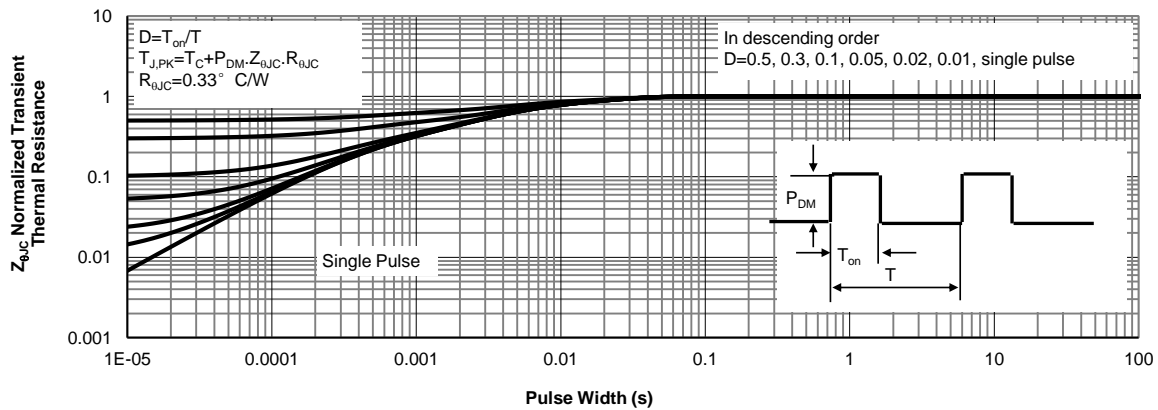
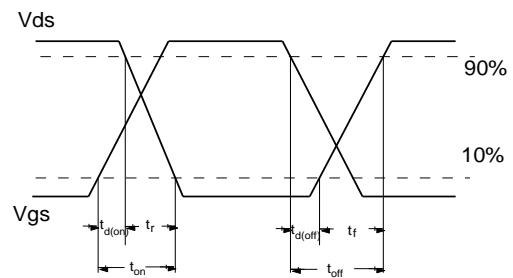
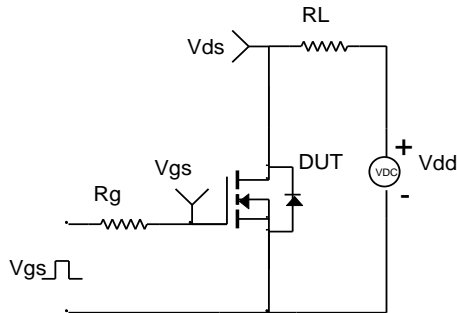


Figure 14: Normalized Maximum Transient Thermal Impedance for AOT(B)095A60L (Note F)

Gate Charge Test Circuit & Waveform



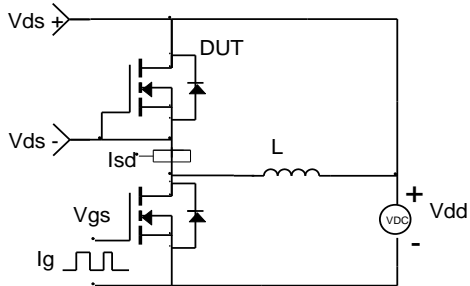
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

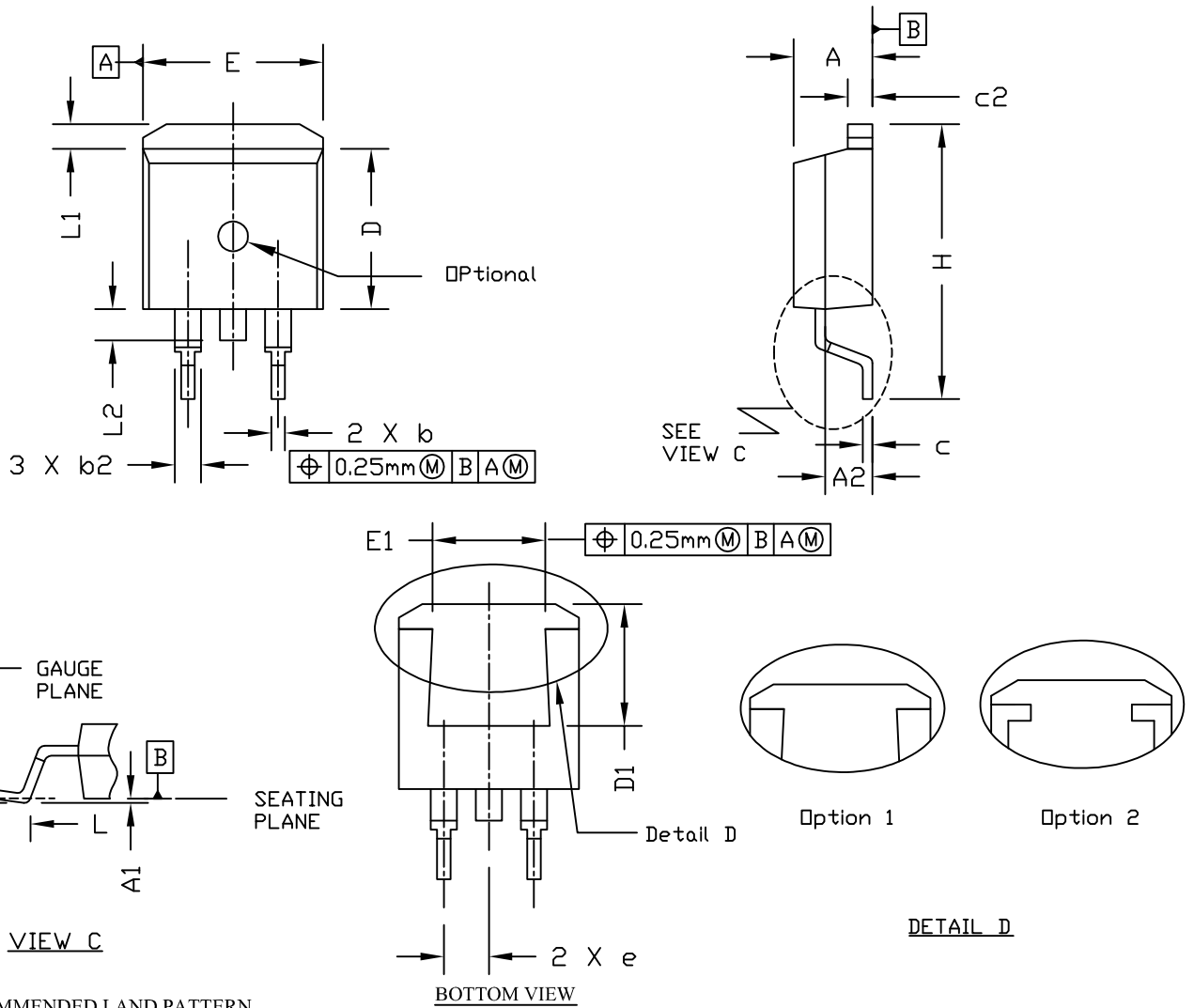


Diode Recovery Test Circuit & Waveforms

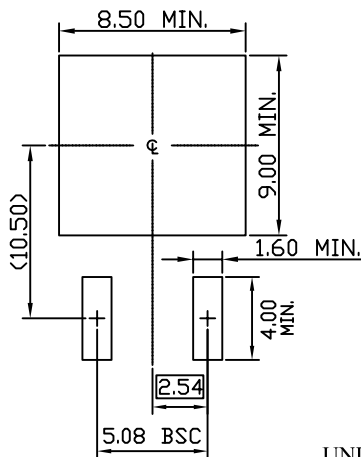




T0263(D2PAK) PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.064	4.45	4.826	0.160	0.175	0.190
A1	0.00	---	0.254	0.000	---	0.010
A2	2.20	2.67	2.90	0.087	0.105	0.114
b	0.508	0.81	0.991	0.020	0.032	0.039
b2	1.143	1.27	1.778	0.045	0.050	0.070
c	0.381	0.50	0.737	0.015	0.020	0.029
c2	1.143	1.27	1.651	0.045	0.050	0.065
D	8.382	9.14	9.652	0.330	0.360	0.380
D1	6.858	8.00	8.37	0.270	0.315	0.330
e	2.54 BSC			0.100 BSC		
E	9.652	10.03	10.668	0.380	0.395	0.420
E1	6.223	8.00	8.37	0.245	0.315	0.330
H	14.605	15.24	15.875	0.575	0.600	0.625
L	1.778	2.54	2.794	0.070	0.100	0.110
L1	1.02	1.27	1.676	0.040	0.050	0.066
L2	1.27	1.52	1.778	0.050	0.060	0.070
L3	0.25 BSC			0.010 BSC		

NOTE:

- PACKAGE BODY SIDES EXCLUDE MOLD FLASH AND GATE BURRS. MOLD FLASH SHOULD BE LESS THAN 6 MILS.
- TOLERANCE 0.10 MILLIMETERS UNLESS OTHERWISE SPECIFIED.
- DIMENSION L IS MEASURED IN GAUGE LINE.
- CONTROLLING DIMENSION IS MILLIMETER.
CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
- REFER TO JEDEC TO-263 AB.