Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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ALPHA & OMEGA SEMICONDUCTOR

AOD5T40P

400V,3.9A N-Channel MOSFET

General Description

- Trench Power AlphaMOS-II technology
- Low $R_{DS(ON)}$
- Low Ciss and Crss
- High Current Capability
- RoHS and Halogen Free Compliant

Applications

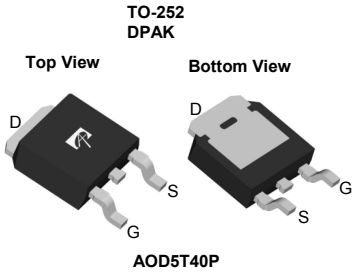
- General Lighting for LED and CCFL
- AC/DC Power supplies for Industrial, Consumer, and Telecom

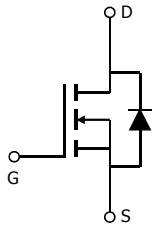
Product Summary

V_{DS} @ $T_{j,max}$	500V
I_{DM}	15A
$R_{DS(ON),max}$	< 1.45Ω
$Q_{g,typ}$	5nC
E_{oss} @ 320V	0.9µJ

100% UIS Tested
100% R_g Tested

Green Product





Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOD5T40P	TO-252	Tape & Reel	2500

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	400	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current	T_C=25°C	I_D	3.9	A
	T_C=100°C		2.5	
Pulsed Drain Current [C]		I_{DM}	15	
Avalanche Current [C] L=1mH		I_{AR}	5	A
Repetitive avalanche energy [C]		E_{AR}	13	mJ
Single pulsed avalanche energy [H]		E_{AS}	108	mJ
MOSFET dv/dt ruggedness		dv/dt	50	V/ns
Peak diode recovery dv/dt			5	
Power Dissipation [B]	T_C=25°C	P_D	52	W
	Derate above 25°C		0.4	W/°C
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		T_L	300	°C

Thermal Characteristics

Parameter	Symbol	Typical	Maximum	Units
Maximum Junction-to-Ambient [A,D]	$R_{\theta JA}$	45	55	°C/W
Maximum Case-to-sink [A]	$R_{\theta CS}$	-	0.5	°C/W
Maximum Junction-to-Case [D,F]	$R_{\theta JC}$	2	2.4	°C/W

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	400			V
		I_D=250µA, V_{GS}=0V, T_J=150°C		500		
BV_{DSS} /ΔTJ	Breakdown Voltage Temperature Coefficient	I_D=250µA, V_{GS}=0V		0.39		V/ °C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=400V, V_{GS}=0V			1	µA
		V_{DS}=320V, T_J=125°C			10	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±30V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=5V, I_D=250µA	3	4.2	5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=1A		1.2	1.45	Ω
g_{FS}	Forward Transconductance	V_{DS}=40V, I_D=1A		1.9		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.8	1	V
I_S	Maximum Body-Diode Continuous Current				3.9	A
I_{SM}	Maximum Body-Diode Pulsed Current [C]				15	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=100V, f=1MHz		273		pF
C_{oss}	Output Capacitance			16		pF
$C_{o(er)}$	Effective output capacitance, energy related [I]	V_{GS}=0V, V_{DS}=0 to 320V, f=1MHz		18		pF
$C_{o(tr)}$	Effective output capacitance, time related [J]			30		pF
C_{rss}	Reverse Transfer Capacitance	V_{GS}=0V, V_{DS}=100V, f=1MHz		1.5		pF
R_g	Gate resistance	f=1MHz		2.3		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=320V, I_D=3.9A		5	9	nC
Q_{gs}	Gate Source Charge			1.8		nC
Q_{gd}	Gate Drain Charge			1.4		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=200V, I_D=3.9A, R_G=25Ω		17		ns
t_r	Turn-On Rise Time			14		ns
$t_{D(off)}$	Turn-Off DelayTime			18		ns
t_f	Turn-Off Fall Time			9		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=3.9A,dI/dt=100A/µs,V_{DS}=100V		172		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=3.9A,dI/dt=100A/µs,V_{DS}=100V		1.1		µC

A. The value of R_{qJA} 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 in a TO252 package, 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.
D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case R_{qJC} 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.
G.These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.
H. L=60mH, I_{AS}=1.9A, V_{DD}=150V, R_G=10Ω, Starting T_J=25° C.
I. $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% $V_{(BR)DSS}$.
J. $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% $V_{(BR)DSS}$.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

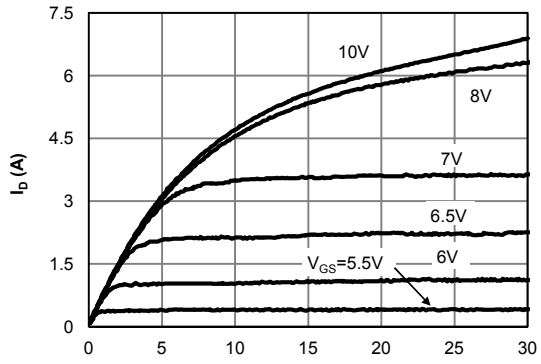


Figure 1: On-Region Characteristics

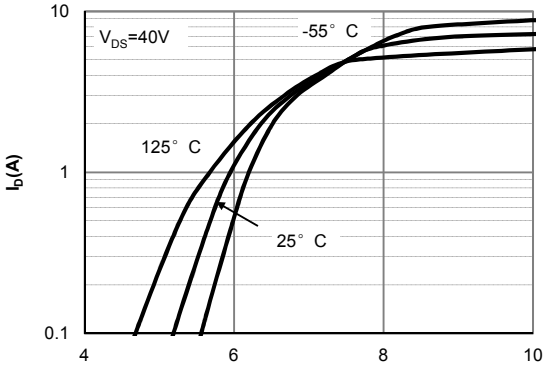


Figure 2: Transfer Characteristics

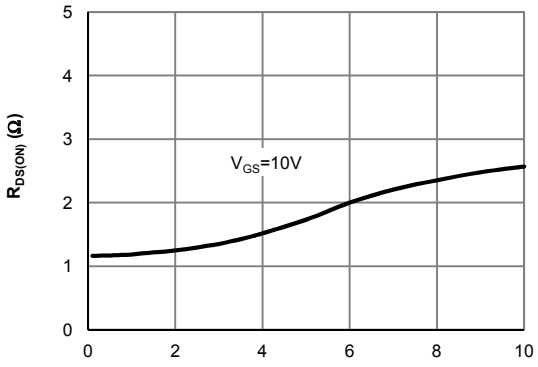


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

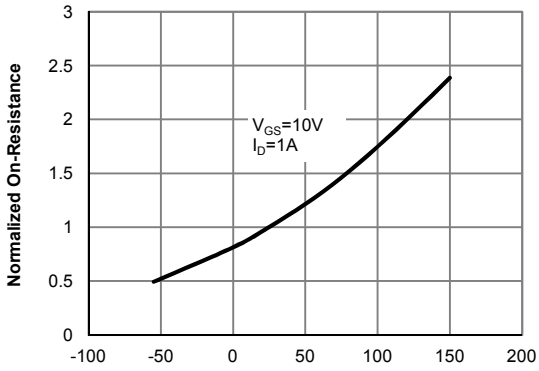


Figure 4: On-Resistance vs. Junction Temperature

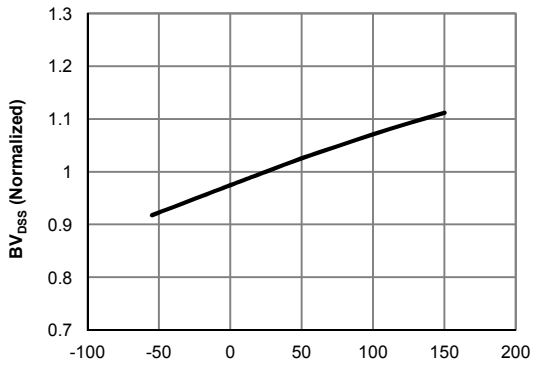


Figure 5: Break Down vs. Junction Temperature

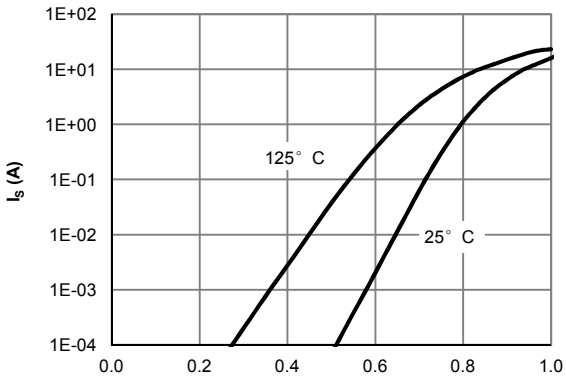


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

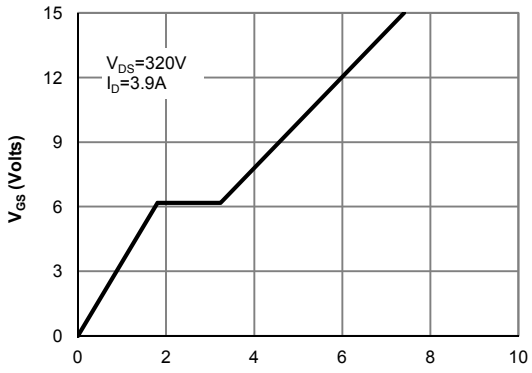


Figure 7: Gate-Charge Characteristics

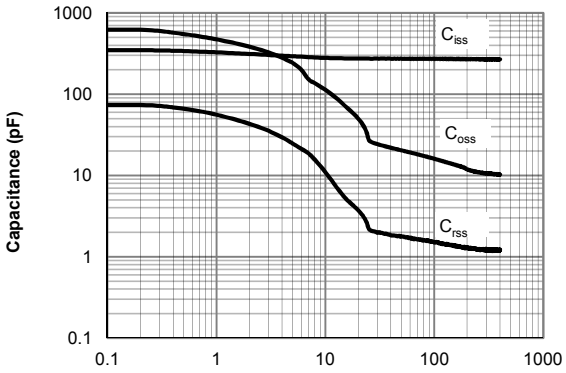


Figure 8: Capacitance Characteristics

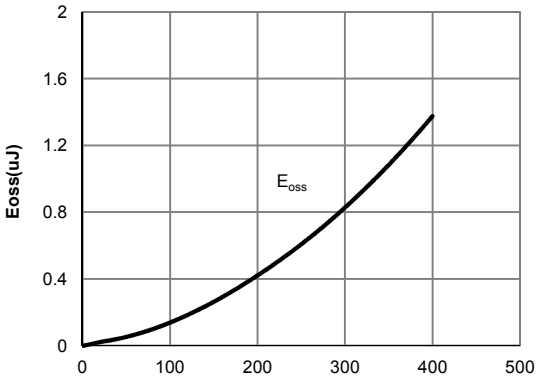


Figure 9: Coss stored Energy

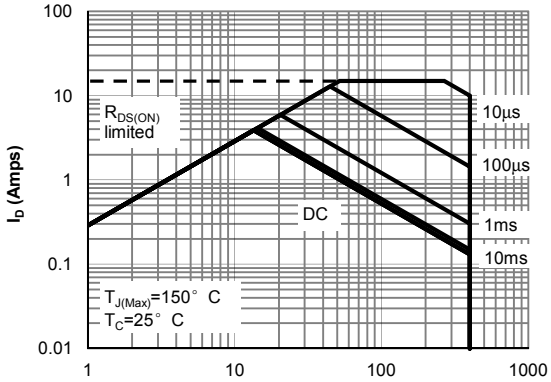


Figure 10: Maximum Forward Biased Safe Operating Area (Note F)

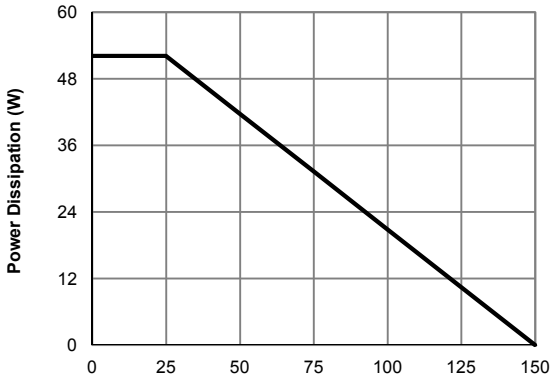


Figure 11: Power De-rating (Note B)

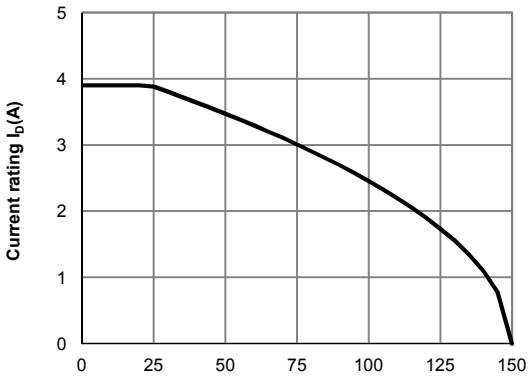


Figure 12: Current De-rating (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

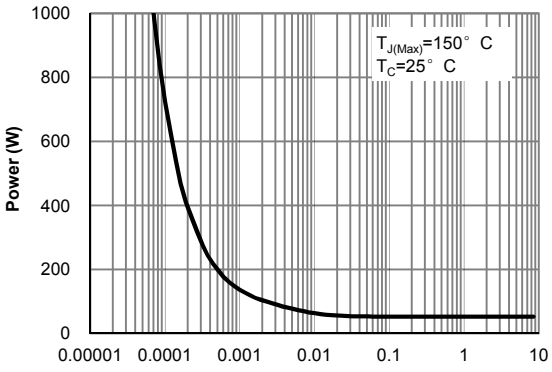


Figure 13: Single Pulse Power Rating Junction-to-Case (Note F)

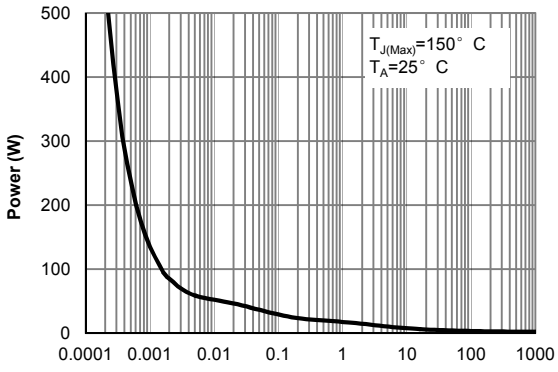


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

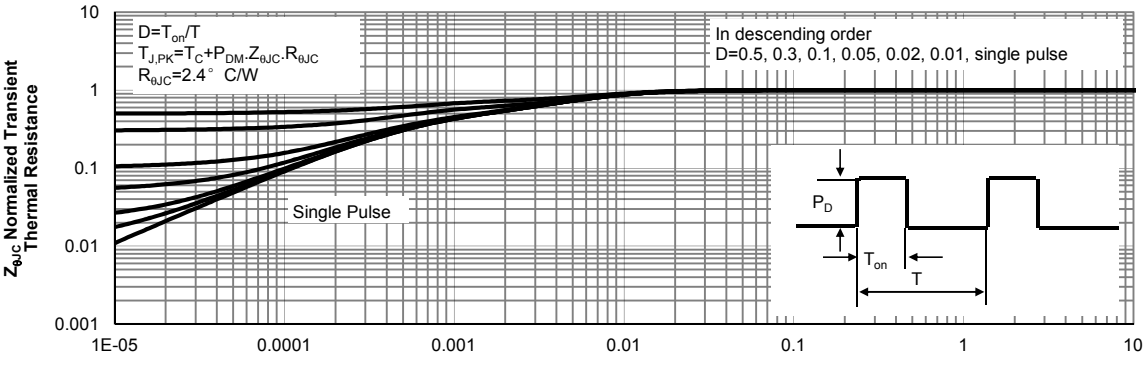


Figure 15: Normalized Maximum Transient Thermal Impedance (Note F)

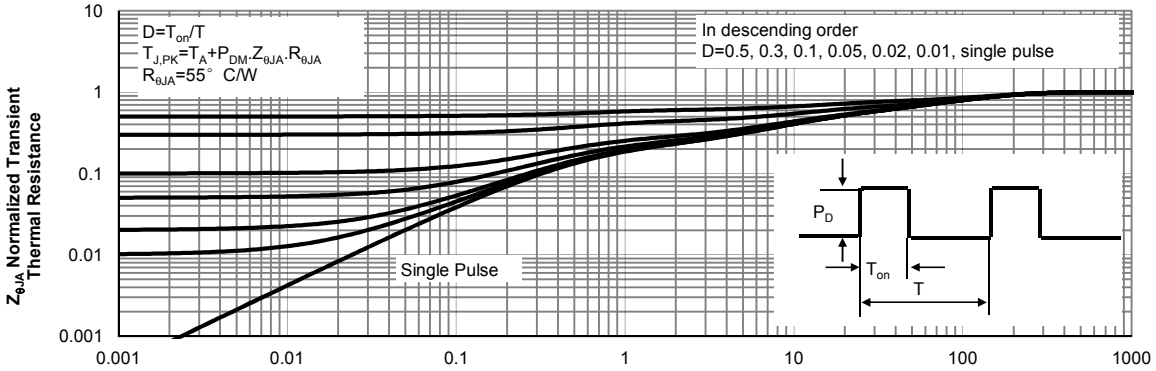
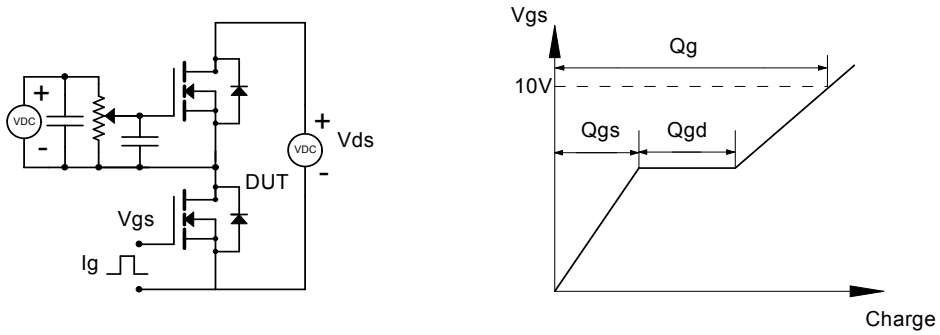
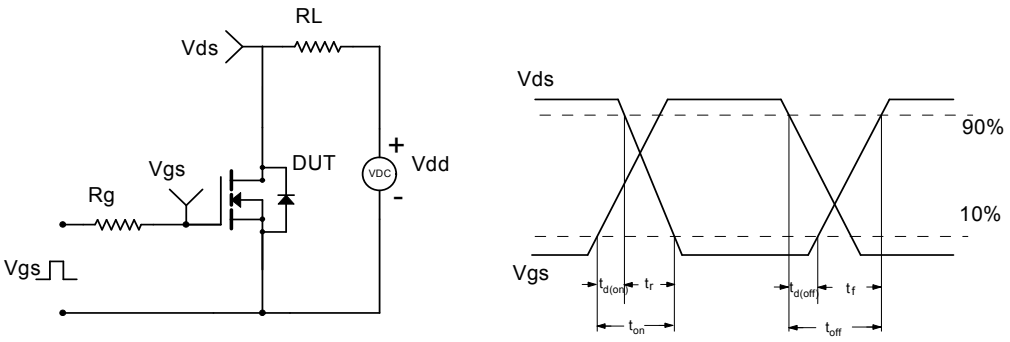


Figure 16: Normalized Maximum Transient Thermal Impedance (Note G)

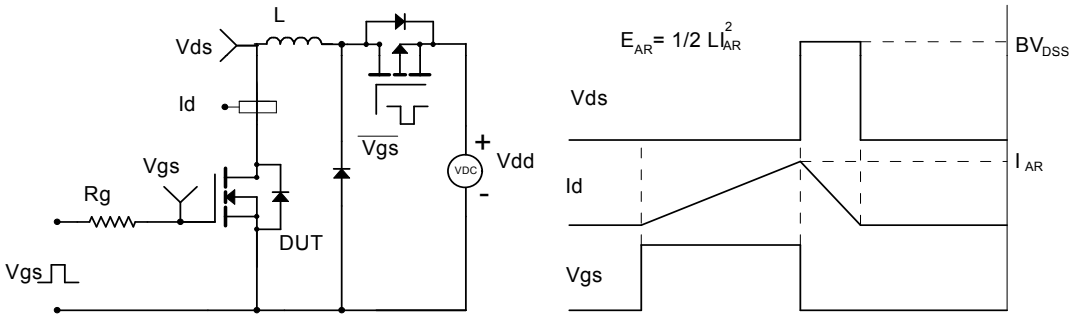
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms