AONR21305C

30V P-Channel MOSFET

General Description

- Latest Advanced Trench Technology
- Low $R_{DS(ON)}$
- High Current Capability
- RoHS and Halogen-Free Compliant

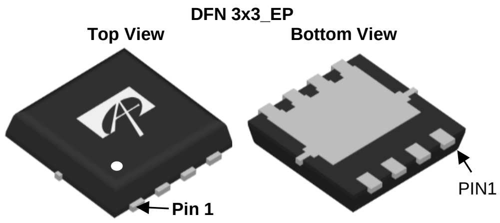
Product Summary

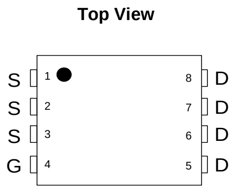
V_{DS}	-30V
I_D (at V_{GS}=-10V)	-34A
$R_{DS(ON)}$ (at V_{GS}=-10V)	< 6.5mΩ
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	< 9.8mΩ

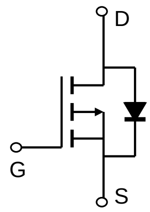
100% UIS Tested
100% Rg Tested

Applications

- Notebook AC-in Load Switch
- Battery Protection Charge/Discharge







Orderable Part Number	Package Type	Form	Minimum Order Quantity
AONR21305C	DFN 3x3 EP	Tape & Reel	5000

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [G]	T_C=25°C	I_D	-34	A
	T_C=100°C		-34	
Pulsed Drain Current [C]		I_{DM}	-210	
Continuous Drain Current	T_A=25°C	I_{DSM}	-22	A
	T_A=70°C		-18	
Avalanche Current [C]		I_{AS}	-44	A
Avalanche energy	L=0.1mH [C]	E_{AS}	97	mJ
Power Dissipation [B]	T_C=25°C	P_D	42	W
	T_C=100°C		16	
Power Dissipation [A]	T_A=25°C	P_{DSM}	5	W
	T_A=70°C		3.2	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	20	25	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		45	55	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	2.4	3	°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	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V, V_{GS}=0V			-1	µA
		T_J=55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±20V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=$V_{GS,}$ I_D=-250µA	-1.3	-1.8	-2.3	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-20A		5.3	6.5	mΩ
		T_J=125°C		7.4	9	
		V_{GS}=-4.5V, I_D=-20A		7.7	9.8	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-20A		73		S
V_{SD}	Diode Forward Voltage	I_S=-1A, V_{GS}=0V		-0.7	-1	V
I_S	Maximum Body-Diode Continuous Current [G]				-34	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz		4400		pF
C_{oss}	Output Capacitance			505		pF
C_{rss}	Reverse Transfer Capacitance			415		pF
R_g	Gate resistance	f=1MHz		2.7	5.4	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-20A		70	110	nC
Q_g(4.5V)	Total Gate Charge			32	50	nC
Q_{gs}	Gate Source Charge			10		nC
Q_{gd}	Gate Drain Charge			16		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=0.75Ω, R_{GEN}=3Ω		12		ns
t_r	Turn-On Rise Time			11		ns
$t_{D(off)}$	Turn-Off DelayTime			70		ns
t_f	Turn-Off Fall Time			23		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-20A, di/dt=500A/µs		15		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-20A, di/dt=500A/µs		34		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A =25° C. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ t≤ 10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.
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. Single 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 $R_{\theta JC}$ 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. The maximum current rating is package limited.
H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

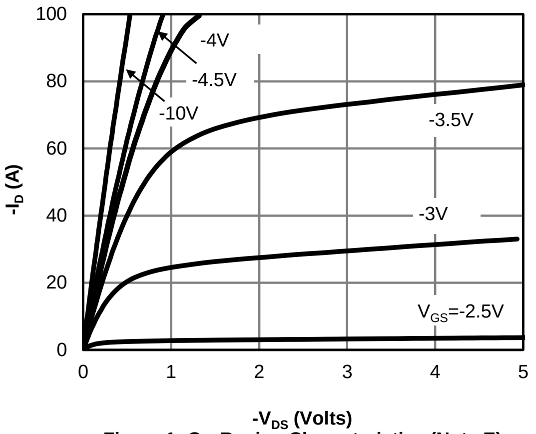


Figure 1: On-Region Characteristics (Note E)

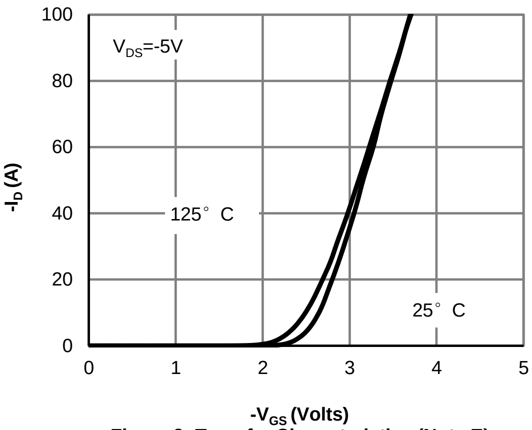


Figure 2: Transfer Characteristics (Note E)

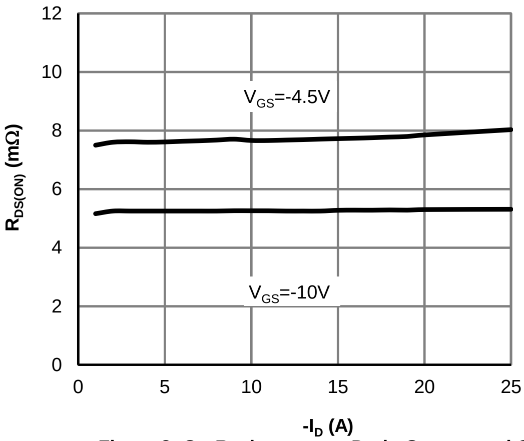


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

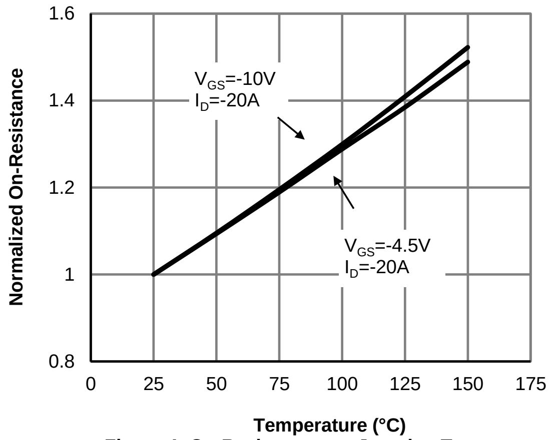


Figure 4: On-Resistance vs. Junction Temperature (Note E)

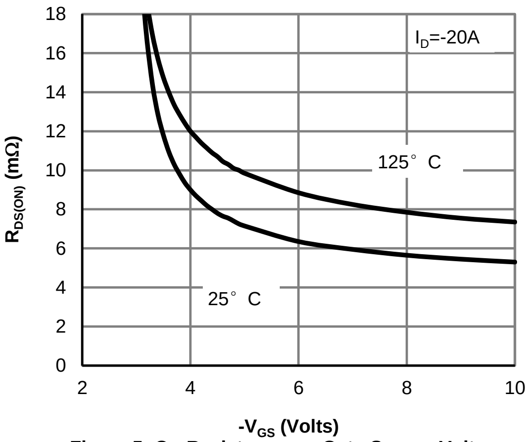


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

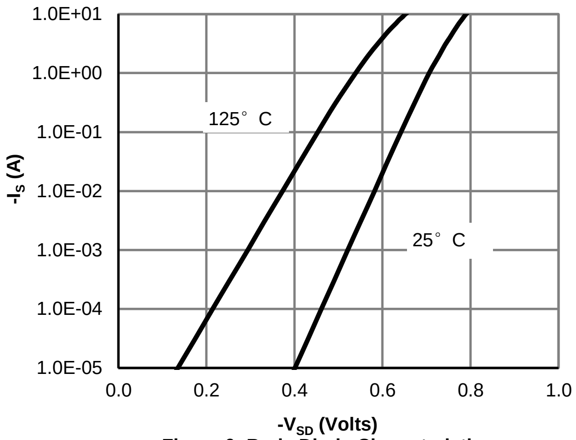


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

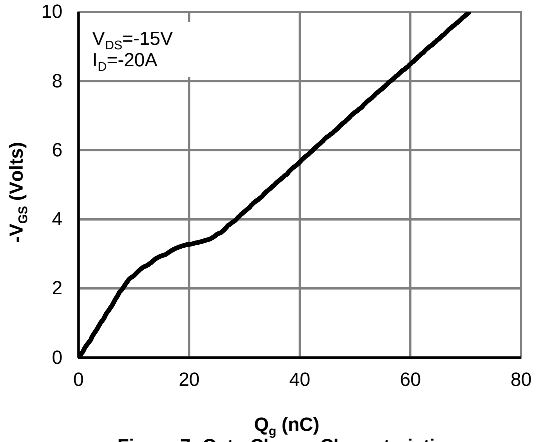


Figure 7: Gate-Charge Characteristics

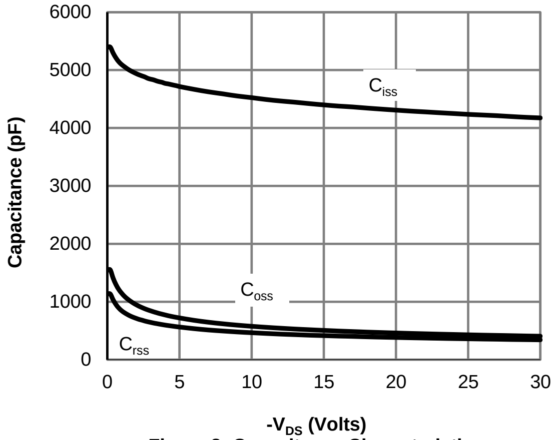
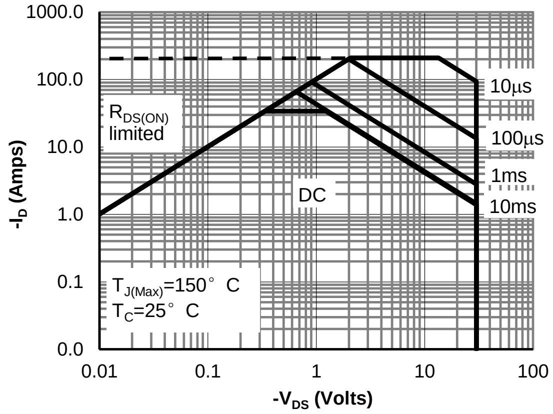


Figure 8: Capacitance Characteristics



$-V_{GS}$> or equal to -4.5V
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

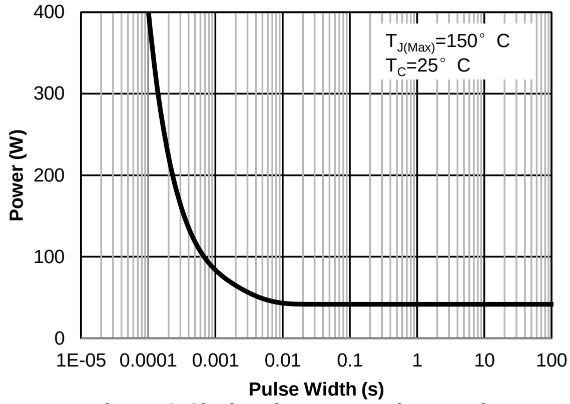


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

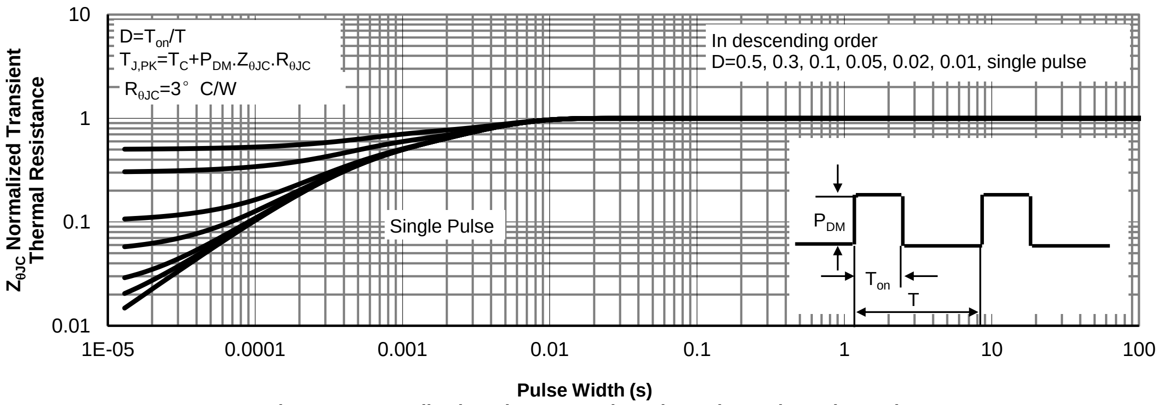


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

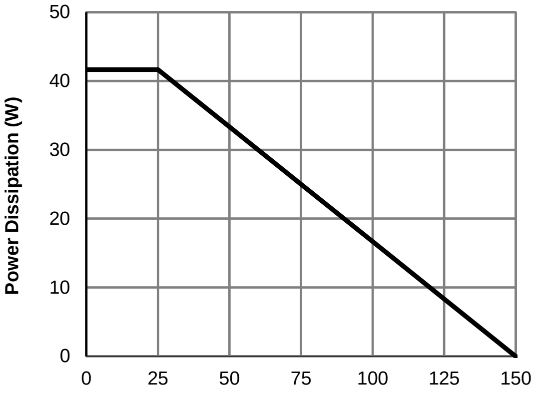


Figure 12: Power De-rating (Note F)

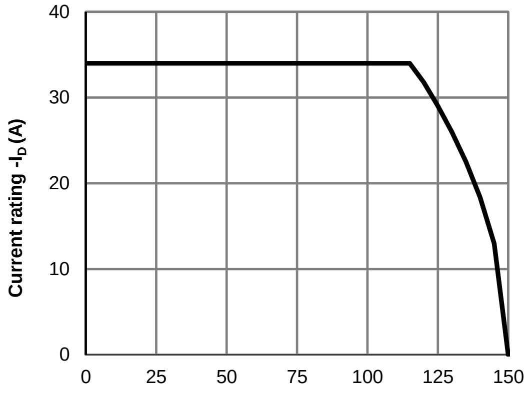


Figure 13: Current De-rating (Note F)

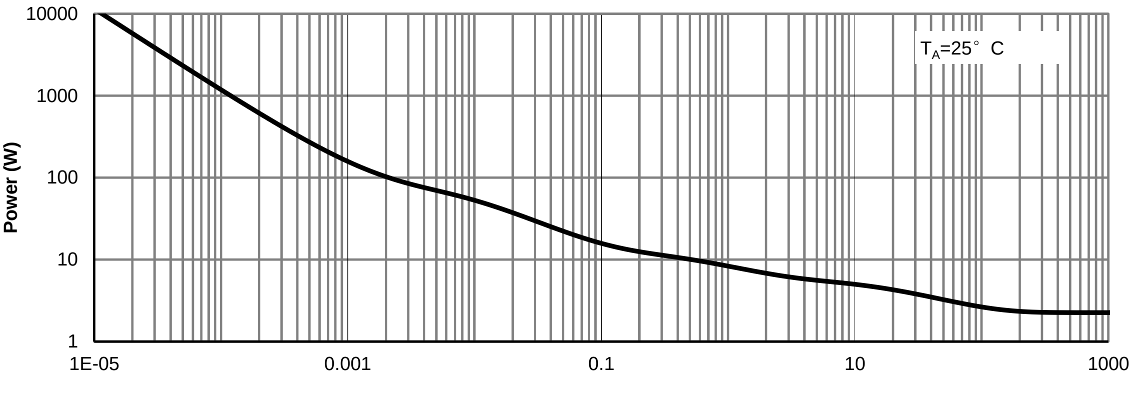


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

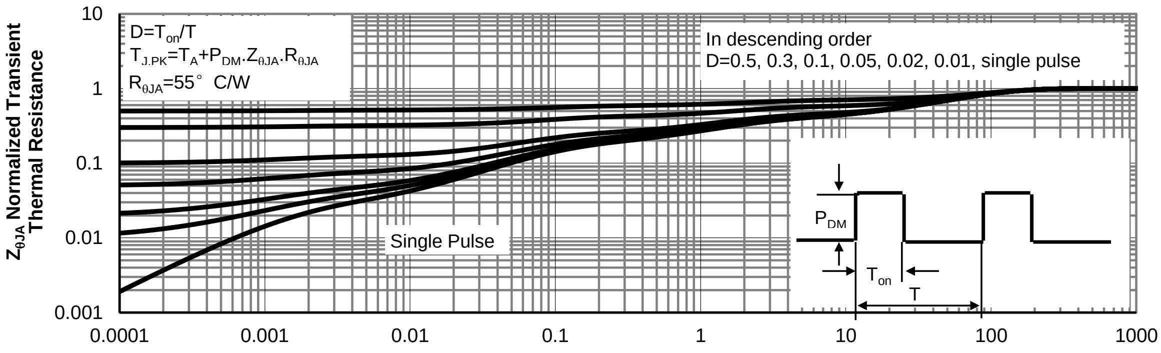
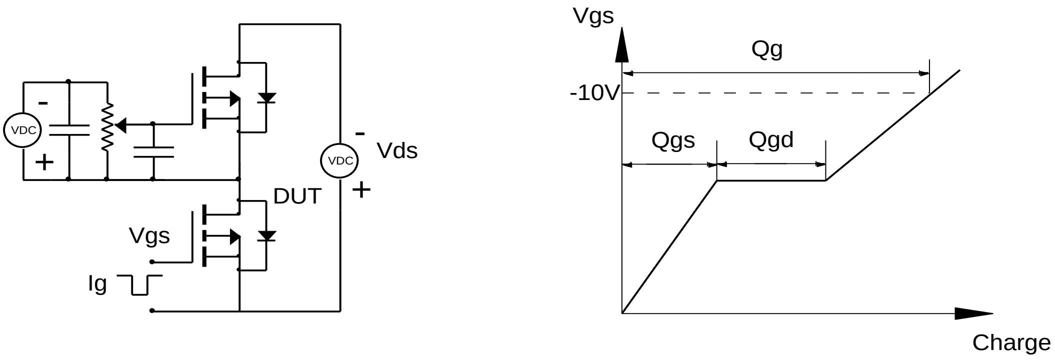
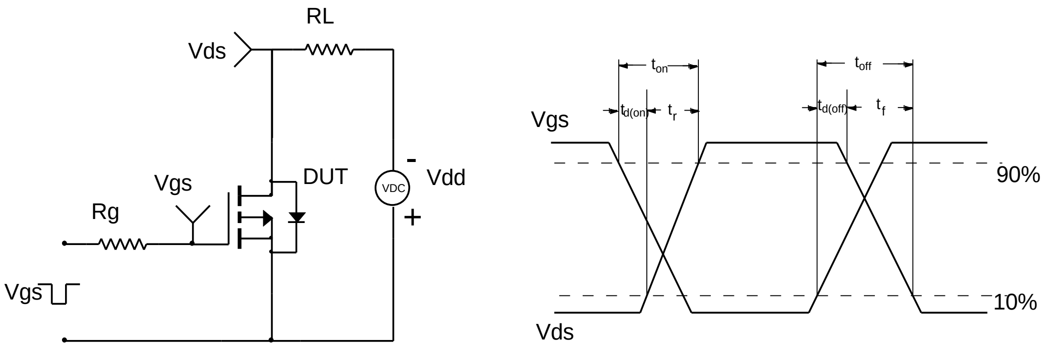


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

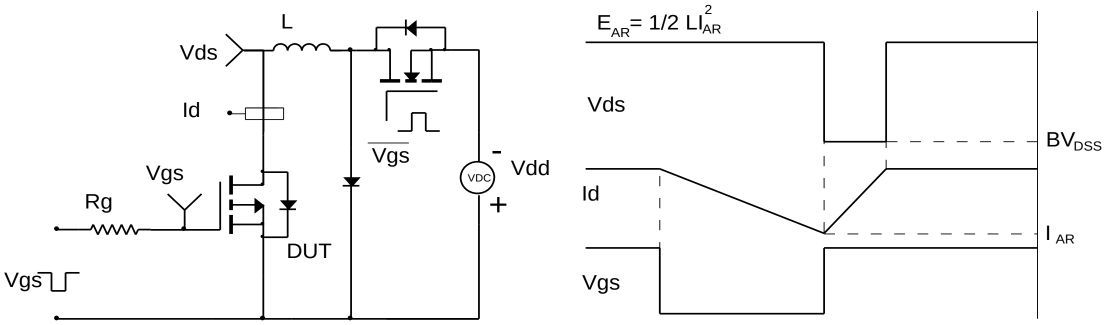
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms