ALPHA & OMEGA SEMICONDUCTOR

AON7460

300V,4A N-Channel MOSFET

General Description

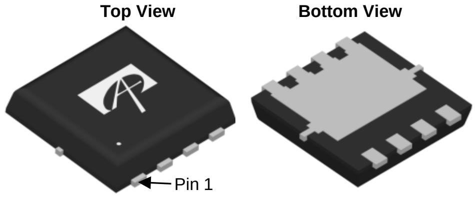
The AON7460 is fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications.By providing low $R_{DS(on)}$, C_{iss} and C_{rss} along with guaranteed avalanche capability this device can be adopted quickly into new and existing offline power supply designs.This device is ideal for boost converters and synchronous rectifiers for consumer, telecom, industrial power supplies and LED backlighting.

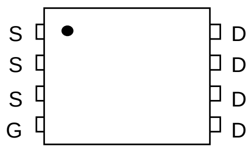
Product Summary

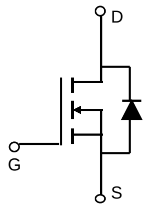
V_{DS}	350V@150℃
I_D (at V_{GS}=10V)	4A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 0.83Ω

100% UIS Tested!
100% R_g Tested!

DFN 3x3A_EP







Absolute Maximum Ratings T_A=25°C unless otherwise noted				
Parameter		**Symbol**	**Maximum**	**Units**
Drain-Source Voltage		V_{DS}	300	V
Gate-Source Voltage		V_{GS}	±30	V
Continuous Drain Current[B]	T_C=25°C	I_D	4	A
	T_C=100°C		2.5	
Pulsed Drain Current [C]		I_{DM}	13	
Continuous Drain Current	T_A=25°C	I_{DSM}	1.2	A
	T_A=70°C		1.0	
Avalanche Current [C]		I_{AR}	2.1	A
Repetitive avalanche energy [C]		E_{AR}	66	mJ
Single pulsed avalanche energy [G]		E_{AS}	132	mJ
Peak diode recovery dv/dt		dv/dt	5	V/ns
Power Dissipation [B]	T_C=25°C	P_D	33	W
	T_C=100°C		13	W
Power Dissipation [A]	T_A=25°C	P_{DSM}	3.1	W
	T_A=70°C		2	
Junction and Storage Temperature Range		T_J, T_{STG}	-50 to 150	°C

Thermal Characteristics					
Parameter		**Symbol**	**Typ**	**Max**	**Units**
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	30	40	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		60	75	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	3.1	3.7	°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	300			V
		I_D=250µA, V_{GS}=0V, T_J=150°C		350		V
BV_{DSS} /ΔTJ	Zero Gate Voltage Drain Current	ID=250µA, VGS=0V		0.3		V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=300V, V_{GS}=0V			1	µA
		V_{DS}=240V, 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	3.3	3.9	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=1.2A		0.67	0.83	Ω
g_{FS}	Forward Transconductance	V_{DS}=40V, I_D=1.2A		2		S
V_{SD}	Diode Forward Voltage	I_S=1A, V_{GS}=0V		0.76	1	V
I_S	Maximum Body-Diode Continuous Current				4	A
I_{SM}	Maximum Body-Diode Pulsed Current				13	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz	240	310	380	pF
C_{oss}	Output Capacitance		30	45	60	pF
C_{rss}	Reverse Transfer Capacitance			3.0		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	1.4	2.9	4.5	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=240V, I_D=1.2A	5.4	6.8	8.2	nC
Q_{gs}	Gate Source Charge			1.9		nC
Q_{gd}	Gate Drain Charge			2.0		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=150V, I_D=1.2A, R_G=25Ω		17		ns
t_r	Turn-On Rise Time			8		ns
$t_{D(off)}$	Turn-Off DelayTime			29		ns
t_f	Turn-Off Fall Time			12		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=1.2A, dI/dt=100A/µs, V_{DS}=100V	60	88	120	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=1.2A, dI/dt=100A/µs, V_{DS}=100V	0.20	0.29	0.40	µC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² 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 value 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 PD 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 $R_{\theta JA}$ 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.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.
H. L=60mH, I_{AS}=2.1A, V_{DD}=150V, R_G=25Ω, Starting T_J=25° C.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

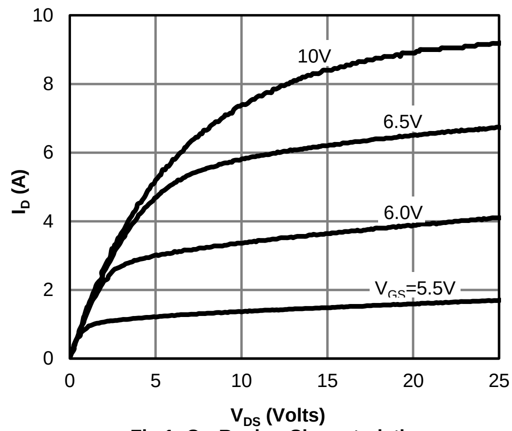


Fig 1: On-Region Characteristics

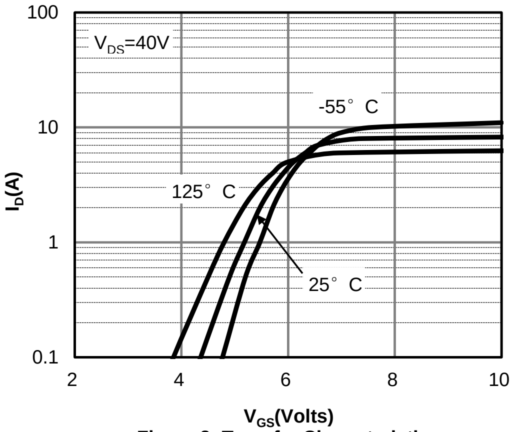


Figure 2: Transfer Characteristics

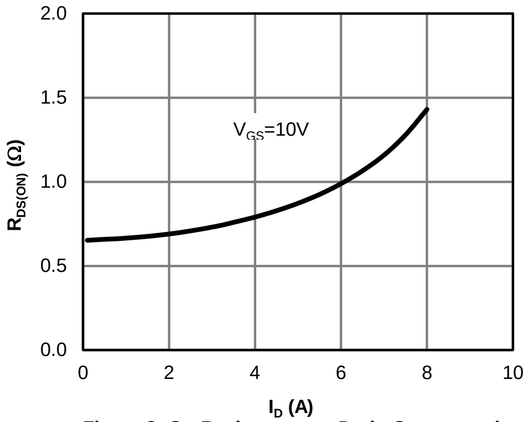


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

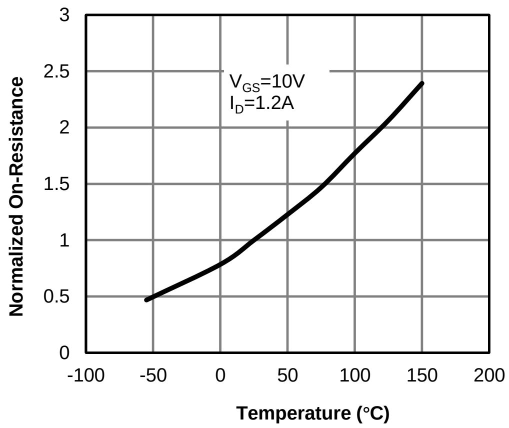


Figure 4: On-Resistance vs. Junction Temperature

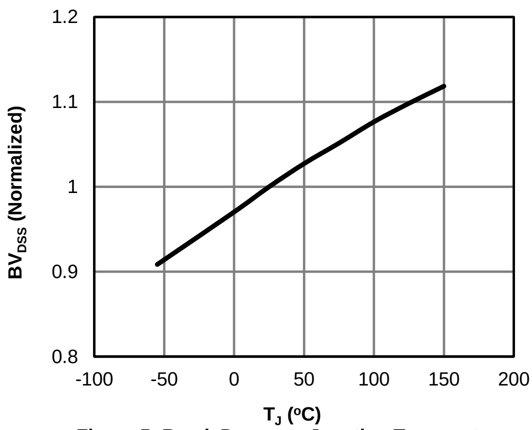


Figure 5: Break Down vs. Junction Temperature

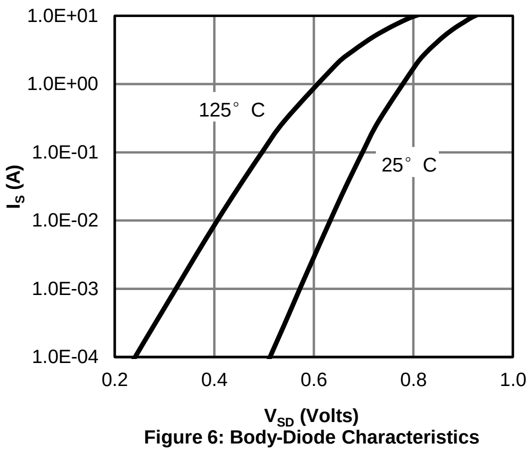


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

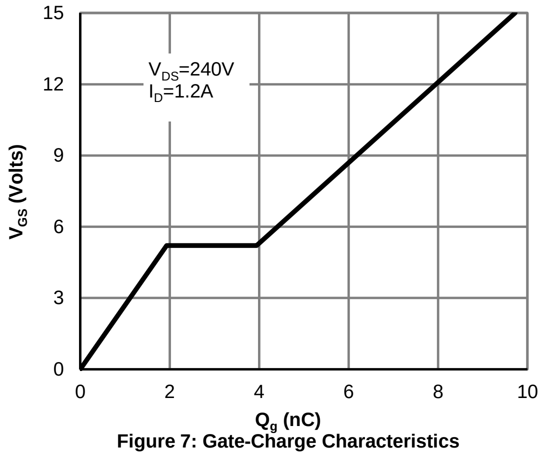


Figure 7: Gate-Charge Characteristics

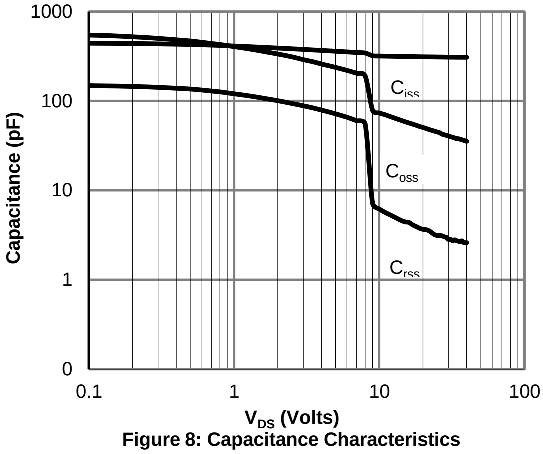


Figure 8: Capacitance Characteristics

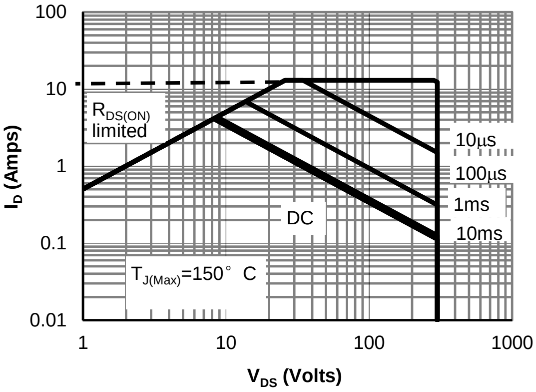


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

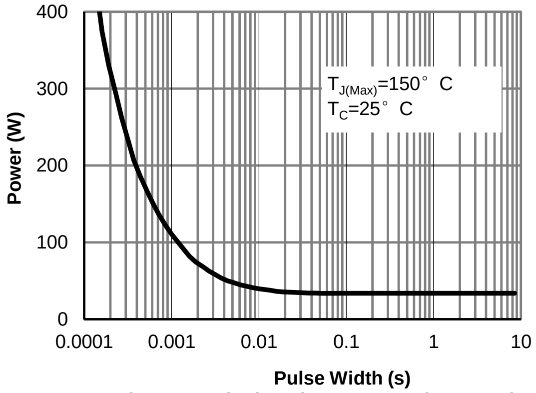


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

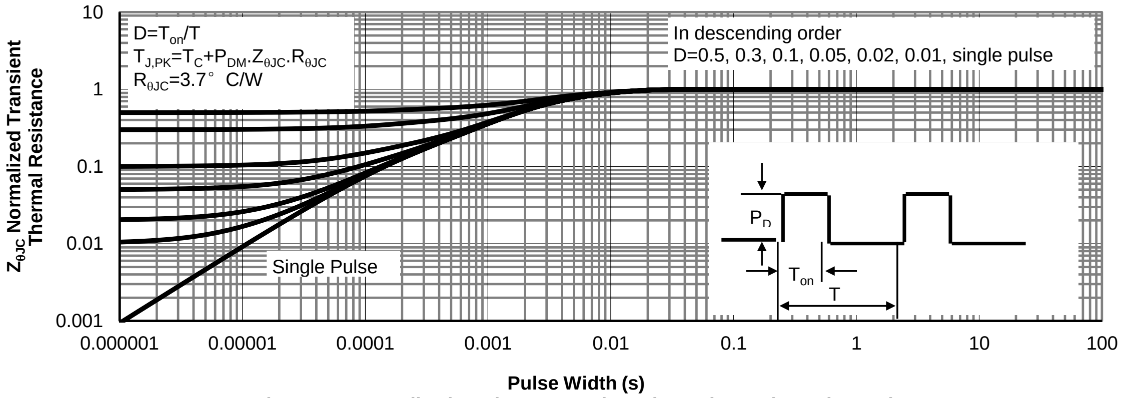


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

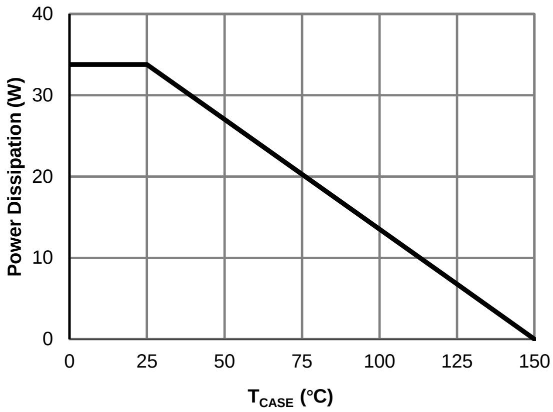


Figure 12: Power De-rating (Note B)

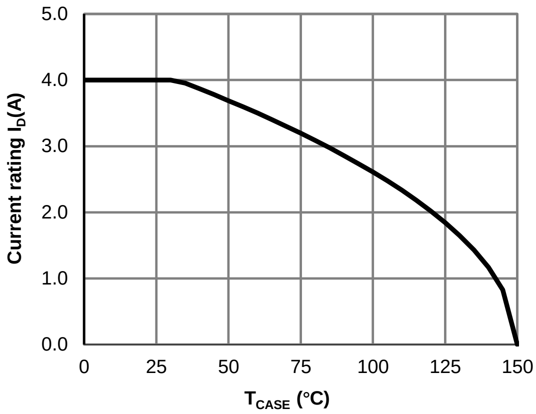


Figure 13: Current De-rating (Note B)

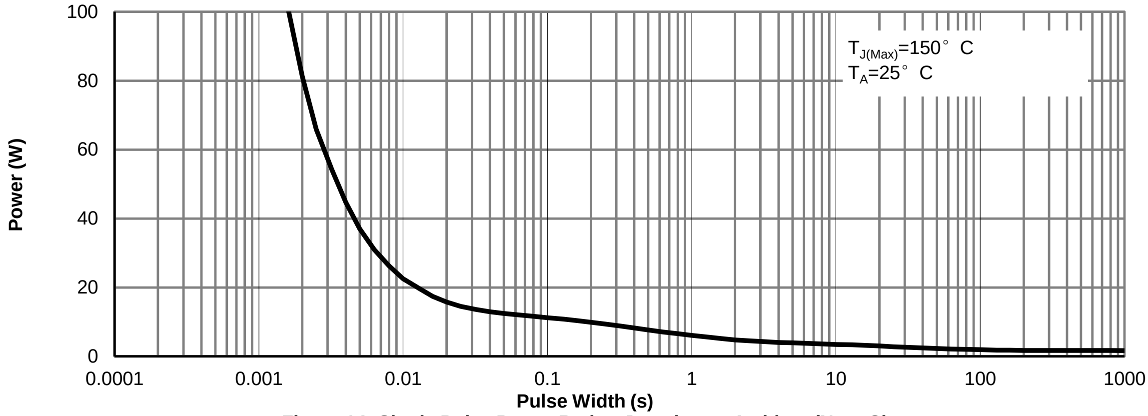


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

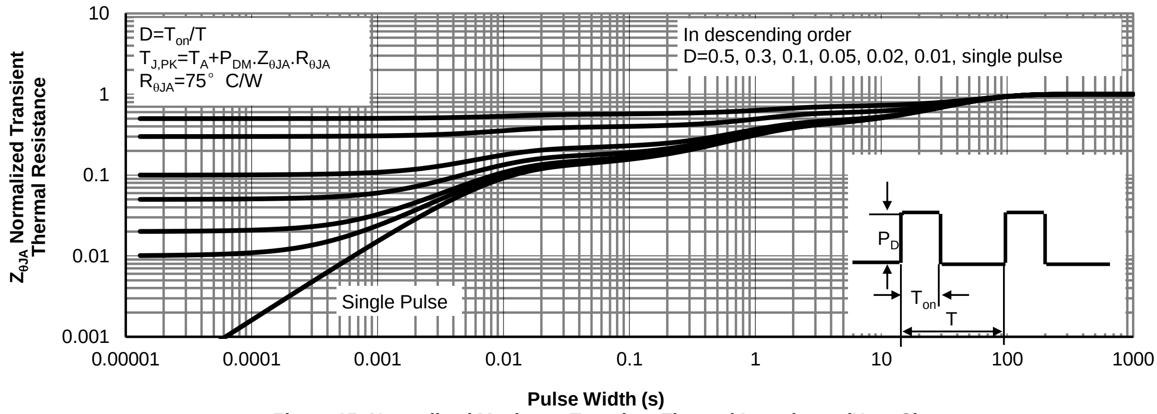
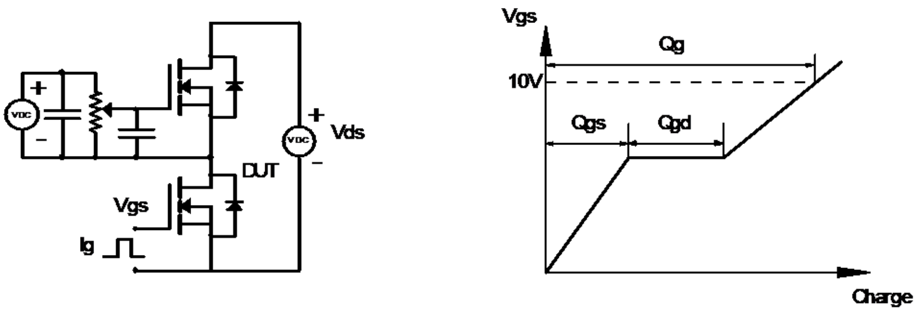
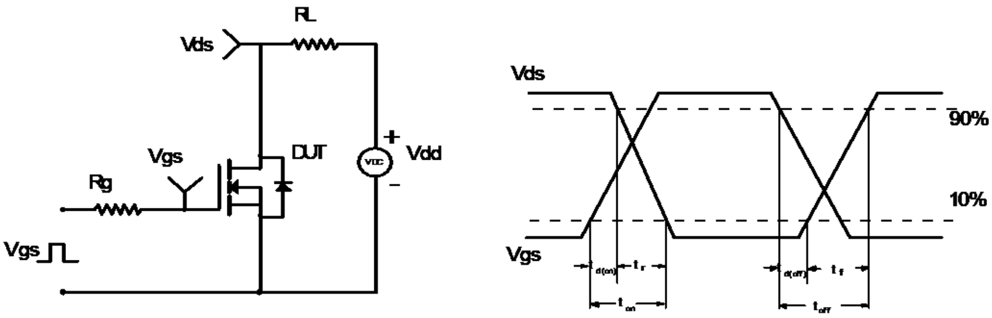


Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)

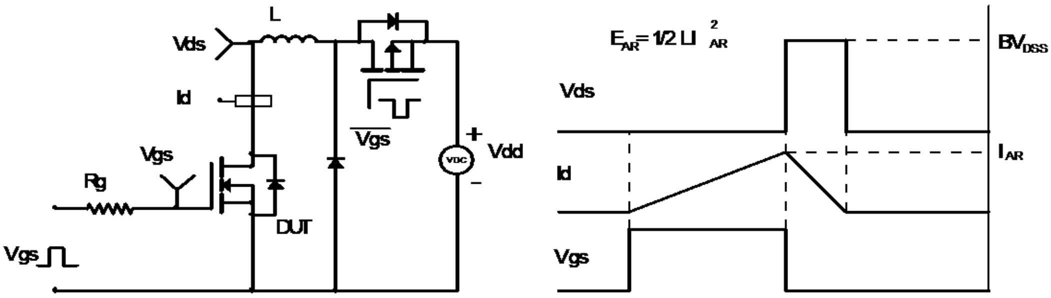
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms