AOT264L/AOB264L
60V N-Channel MOSFET

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General Description

The AOT264L/AOB264L combines advanced trench MOSFET technology with a low resistance package to

provide extremely low $R_{DS(ON)}$. This device is ideal for boost converters and synchronous rectifiers for consumer,

telecom, industrial power supplies and LED backlighting.

Features

V_{DS}	60V
I_D (at V_{GS}=10V)	140A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 3.2mΩ (< 3.0mΩ*)
$R_{DS(ON)}$ (at V_{GS} = 6V)	< 3.5mΩ (< 3.3mΩ*)

Green Product

TO220

**TO-263
D²PAK**
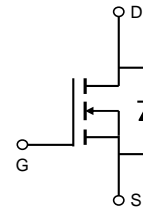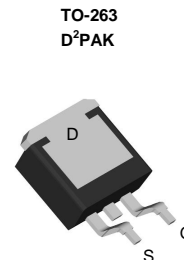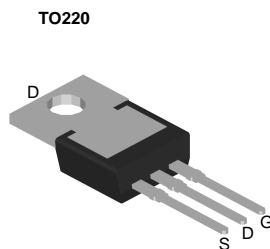
Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [G]	T_C=25℃	I_D	140	A
	T_C=100℃		110	
Pulsed Drain Current [C]		I_{DM}	480	
Continuous Drain Current	T_A=25℃	I_{DSM}	19	A
	T_A=70℃		15	
Avalanche Current [C]		I_{AS}, I_{AR}	100	A
Avalanche energy L=0.1mH [C]		E_{AS}, E_{AR}	500	mJ
Power Dissipation [B]	T_C=25℃	P_D	333	W
	T_C=100℃		167	
Power Dissipation [A]	T_A=25℃	P_{DSM}	2.1	W
	T_A=70℃		1.3	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	℃

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{θJA}$	12	15	℃/W
Maximum Junction-to-Ambient [A D]	Steady-State		48	60	℃/W
Maximum Junction-to-Case	Steady-State	$R_{θJC}$	0.35	0.45	℃/W

* Surface mount package TO263

Electrical Characteristics (T$_J$=25℃ unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV$_{DSS}$	Drain-Source Breakdown Voltage	I$_D$=250µA, V$_{GS}$=0V		60			V
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{DS}$=60V, V$_{GS}$=0V				1	µA
			T$_J$=55℃			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		2.2	2.7	3.2	V
I$_{D(ON)}$	On state drain current	V$_{GS}$=10V, V$_{DS}$=5V		480			A
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=20A TO220			2.4	3.2	mΩ
			T$_J$=125℃		4	4.8	
		V$_{GS}$=6V, I$_D$=20A TO220			2.7	3.5	
		V$_{GS}$=10V, I$_D$=20A TO263			2.3	3.0	
		V$_{GS}$=6V, I$_D$=20A TO263			2.6	3.3	
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=20A			80		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A,V$_{GS}$=0V			0.65	1	V
I$_S$	Maximum Body-Diode Continuous Current[G]					140	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=30V, f=1MHz		5500	6960	8400	pF
C$_{oss}$	Output Capacitance				840		pF
C$_{rss}$	Reverse Transfer Capacitance				30		pF
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, f=1MHz		0.4	0.9	1.4	Ω
SWITCHING PARAMETERS							
Q$_g$(10V)	Total Gate Charge	V$_{GS}$=10V, V$_{DS}$=30V, I$_D$=20A		62	78	94	nC
Q$_{gs}$	Gate Source Charge				25		nC
Q$_{gd}$	Gate Drain Charge				5		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=30V, R$_L$=1.5Ω, R$_{GEN}$=3Ω			23		ns
t$_r$	Turn-On Rise Time				7		ns
t$_{D(off)}$	Turn-Off DelayTime				45		ns
t$_f$	Turn-Off Fall Time				8		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=20A, dI/dt=500A/µs		18	26	34	ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=20A, dI/dt=500A/µs		105	155	202	nC

A. The value of R$_{θJA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T$_A$ =25℃. The Power dissipation P$_{DSM}$ is based on R$_{θJA}$ and the maximum allowed junction temperature of 150℃. The value in any given application depends on the user's specific board design, and the maximum temperature of 175℃ may be used if the PCB allow s it.

B. The power dissipation P$_D$ is based on T$_{J(MAX)}$=175℃, 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$_{J(MAX)}$=175℃. Ratings are based on low frequency and duty cycles to keep initial T$_J$ =25℃.

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$_{J(MAX)}$=175℃. The SOA curve provides a single pulse ratin g.

G. The maximum current rating is package limited.

H. 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℃.
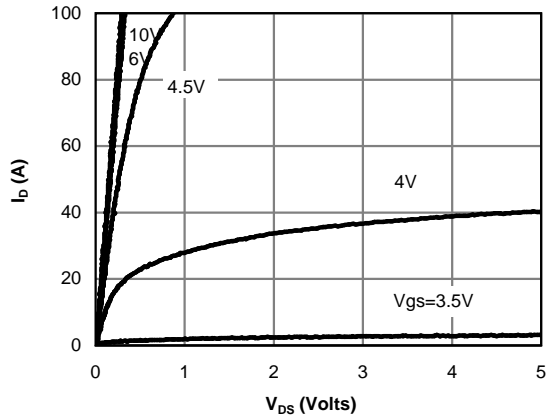
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
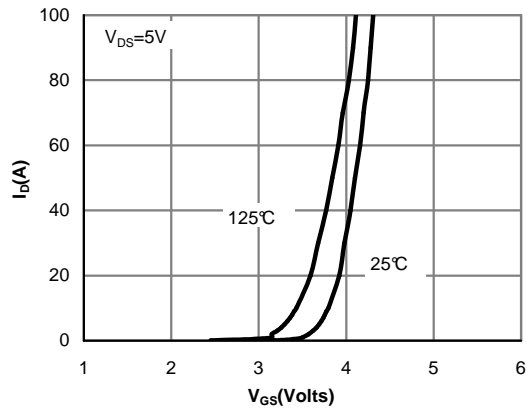
Fig 1: On-Region Characteristics (Note E)

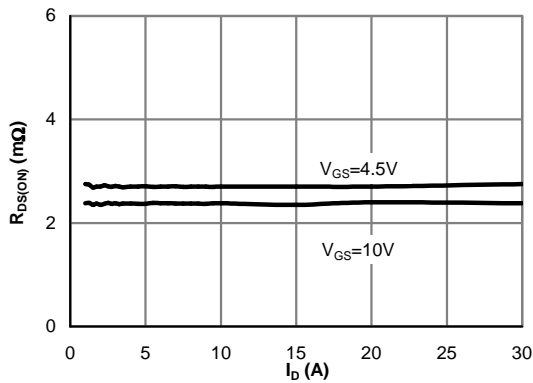Figure 2: Transfer Characteristics (Note E)

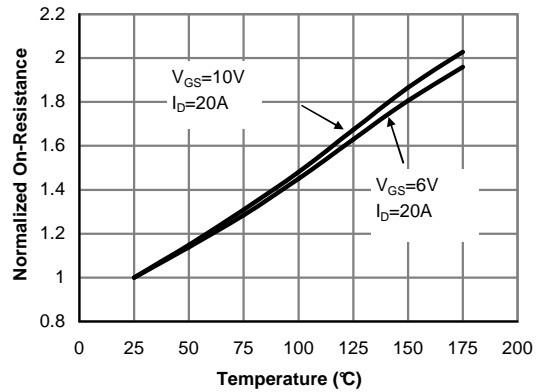Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

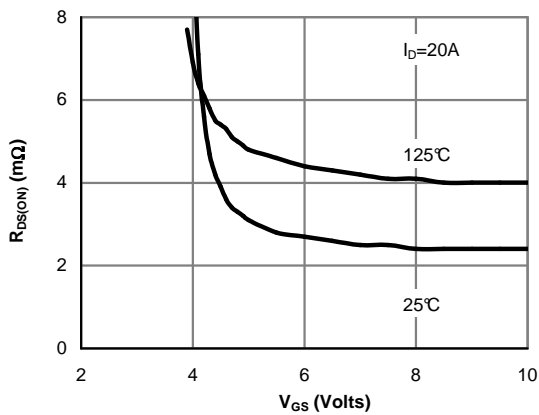Figure 4: On-Resistance vs. Junction Temperature (Note E)

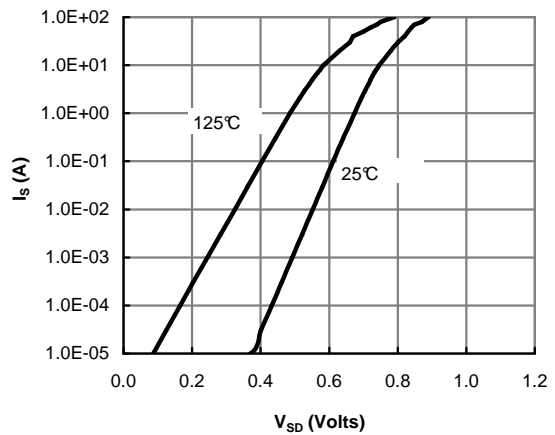Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

Figure 6: Body-Diode Characteristics (Note E)

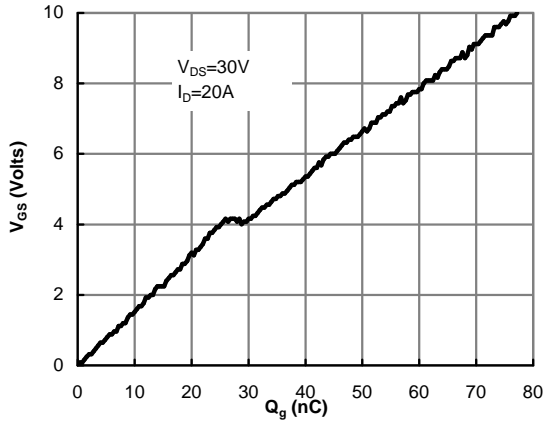## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
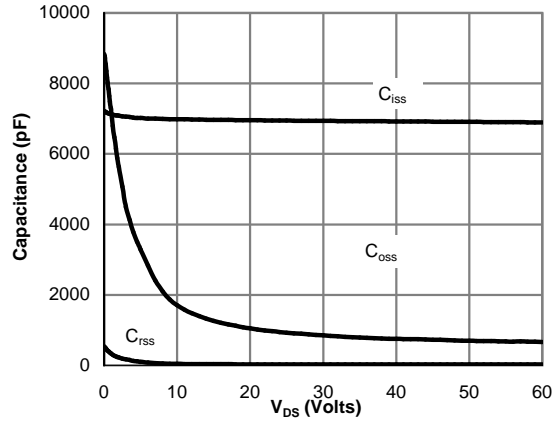

Figure 7: Gate-Charge Characteristics

Figure 8: Capacitance Characteristics
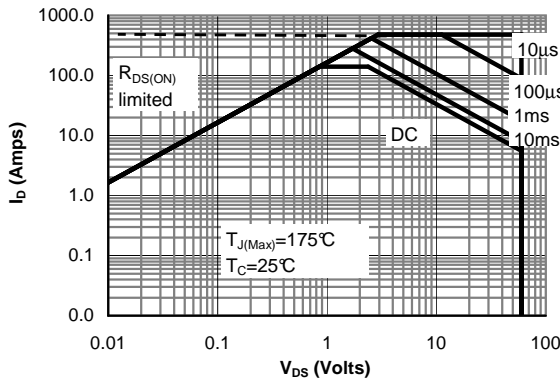
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)
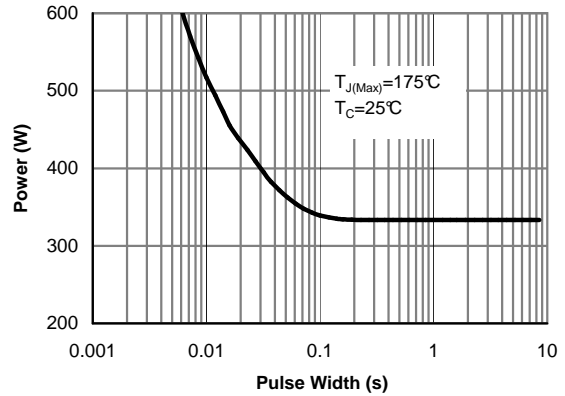
Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)
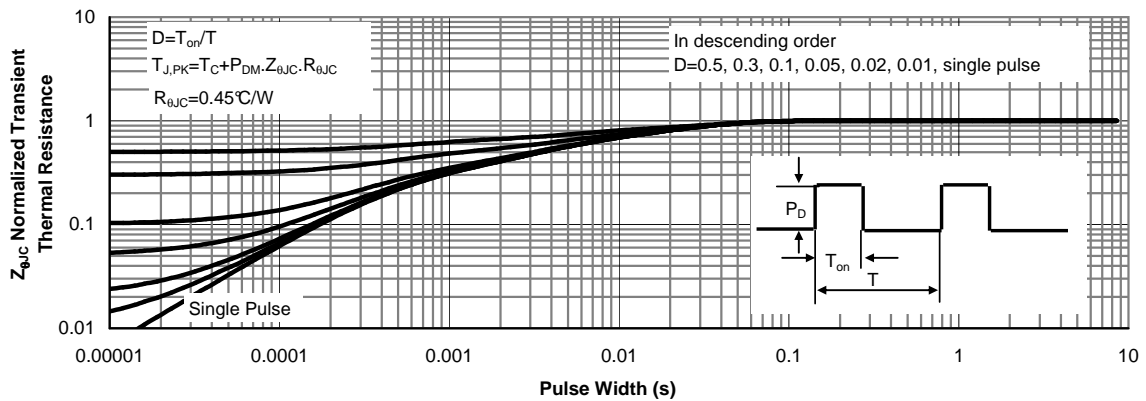
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)
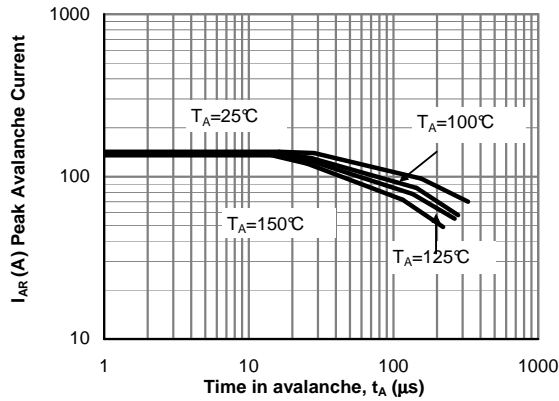
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
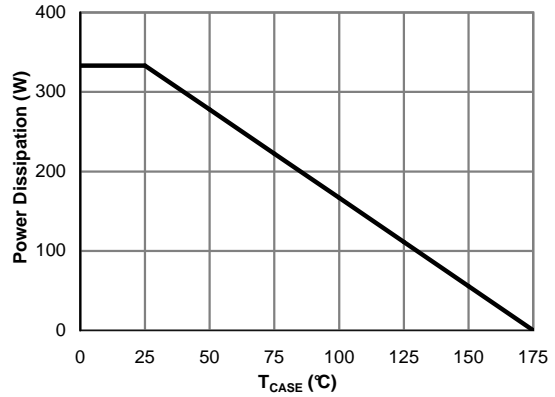
Figure 12: Single Pulse Avalanche capability (Note C)
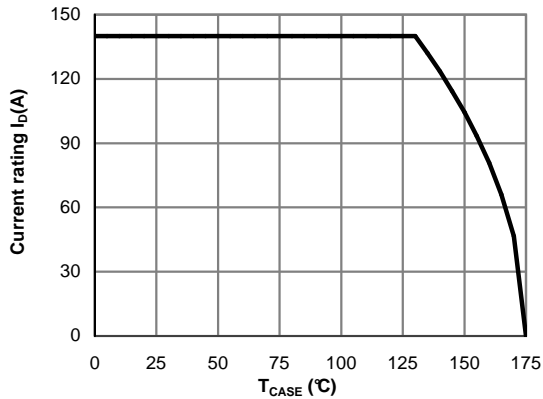
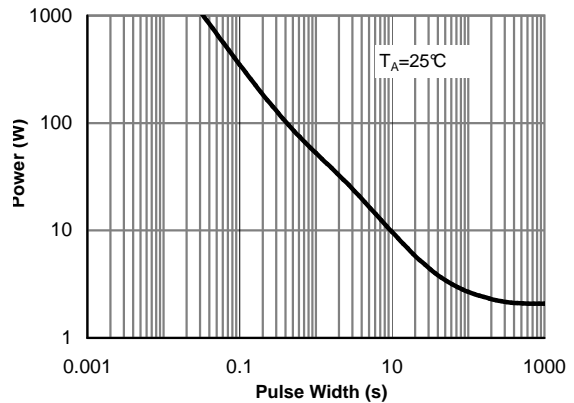Figure 13: Power De-rating (Note F)

Figure 14: Current De-rating (Note F)

Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

$D=T_{on}/T$

$T_{J,PK}=T_A+P_{DM}.Z_{\theta JA}.R_{\theta JA}$

$R_{\theta JA}=60℃/W$

In descending order
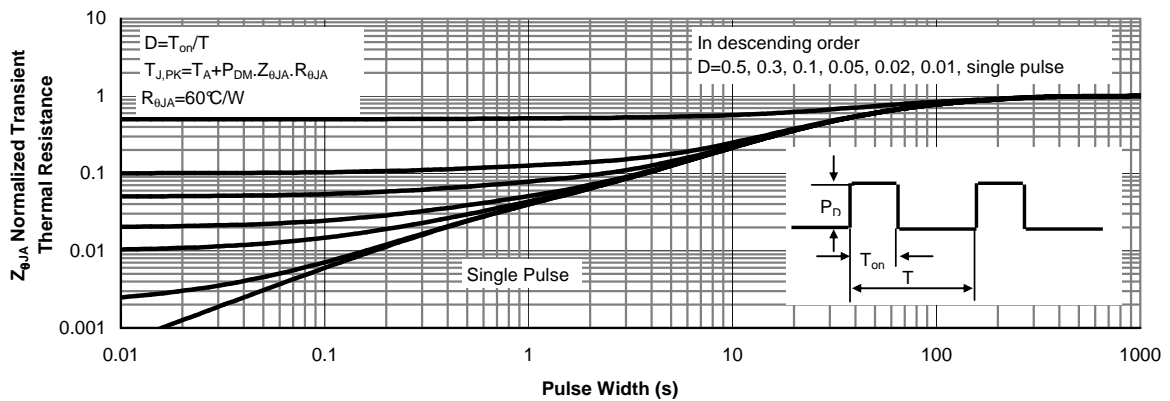
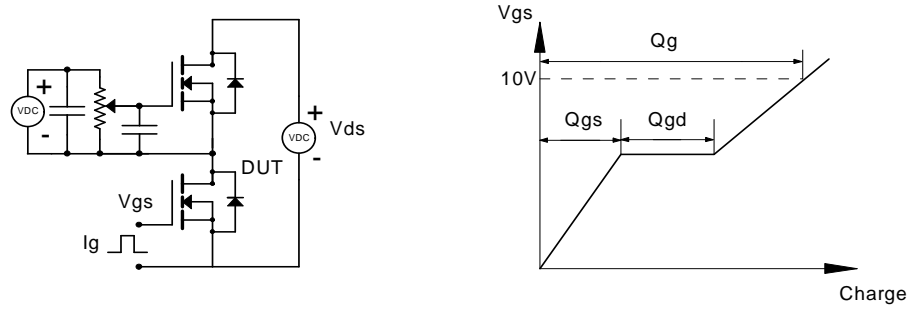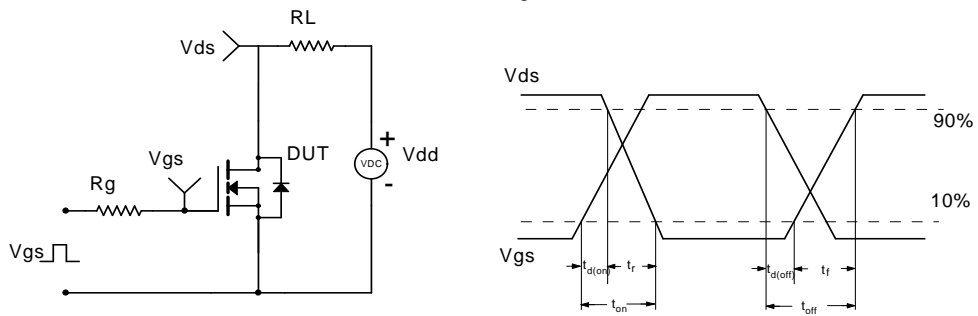D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse

Single Pulse
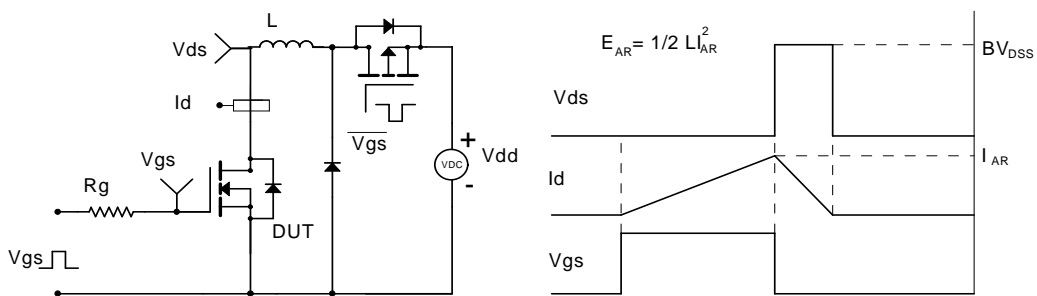
Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 \, LI_{AR}^2$$

Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int Idt$$