ALPHA & OMEGA SEMICONDUCTOR

AOK40B65HQ1

650V, 40A AlphaIGBT™

With soft and fast recovery anti-parallel diode

General Description

- 650V breakdown voltage
- Very high switching speed
- Very low Vf and Qrr
- Low turn-off switching loss and softness
- Very good EMI behavior
- Latest AlphaIGBT technology

Applications

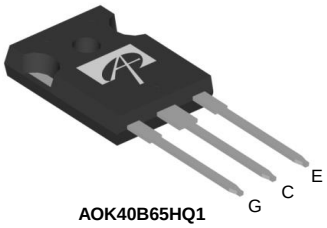
- UPS
- Solar Inverter
- Welding

Product Summary

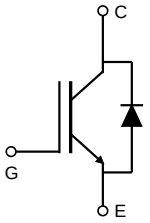
V_{CE}	650V
I_C (T_C=100°C)	40A
$V_{CE(sat)}$ (T_J=25°C)	2.05V

RoHS Compliant

TO-247



AOK40B65HQ1



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOK40B65HQ1	TO247	Tube	240

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	AOK40B65HQ1	Units
Collector-Emitter Voltage		V_{CE}	650	V
Gate-Emitter Voltage		V_{GE}	±30	V
Continuous Collector Current	T_C=25°C	I_C	80	A
	T_C=100°C		40	
Pulsed Collector Current, Limited by T_{Jmax}		I_{CM}	120	A
Turn off SOA, V_{CE}≤650V, Limited by T_{Jmax}		I_{LM}	120	A
Continuous Diode Forward Current	T_C=25°C	I_F	40	A
	T_C=100°C		20	
Diode Pulsed Current, Limited by T_{Jmax}		I_{FM}	60	A
Power Dissipation	T_C=25°C	P_D	312	W
	T_C=100°C		156	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds		T_L	300	°C

Thermal Characteristics

Parameter	Symbol	Typical	Units
Maximum Junction-to-Ambient	$R_{\theta JA}$	40	°C/W
Maximum IGBT Junction-to-Case	$R_{\theta JC}$	0.48	°C/W
Maximum Diode Junction-to-Case	$R_{\theta JC}$	1.6	°C/W

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

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV_{CES}	Collector-Emitter Breakdown Voltage	I_C=1mA, V_{GE}=0V, T_J=25°C		650	-	-	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C=40A	T_J=25°C	-	2.05	2.6	V
			T_J=125°C	-	2.57	-	
			T_J=175°C	-	2.68	-	
V_F	Diode Forward Voltage	V_{GE}=0V, I_F=20A	T_J=25°C	-	1.8	2.25	V
			T_J=125°C	-	1.84	-	
			T_J=175°C	-	1.76	-	
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	V_{CE}=5V, I_C=1mA		-	4.7	-	V
I_{CES}	Zero Gate Voltage Collector Current	V_{CE}=650V, V_{GE}=0V	T_J=25°C	-	-	10	µA
			T_J=125°C	-	-	500	
			T_J=175°C	-	-	5000	
I_{GES}	Gate-Emitter leakage current	V_{CE}=0V, V_{GE}=±30V		-	-	±100	nA
g_{FS}	Forward Transconductance	V_{CE}=20V, I_C=40A		-	24	-	S
DYNAMIC PARAMETERS							
C_{ies}	Input Capacitance	V_{GE}=0V, V_{CC}=25V, f=1MHz		-	1230	-	pF
C_{oes}	Output Capacitance			-	105	-	pF
C_{res}	Reverse Transfer Capacitance			-	44	-	pF
Q_g	Total Gate Charge	V_{GE}=15V, V_{CC}=520V, I_C=40A		-	61	-	nC
Q_{ge}	Gate to Emitter Charge			-	18	-	nC
Q_{gc}	Gate to Collector Charge			-	27	-	nC
R_g	Gate resistance	V_{GE}=0V, V_{CC}=0V, f=1MHz		-	11	-	Ω
SWITCHING PARAMETERS, (Load Inductive, T_J=25°C)							
$t_{D(on)}$	Turn-On DelayTime	T_J=25°C V_{GE}=15V, V_{CC}=400V, I_C=40A, R_G=7.5Ω		-	31	-	ns
t_r	Turn-On Rise Time			-	29	-	ns
$t_{D(off)}$	Turn-Off Delay Time			-	110	-	ns
t_f	Turn-Off Fall Time			-	13	-	ns
E_{on}	Turn-On Energy			-	1.19	-	mJ
E_{off}	Turn-Off Energy			-	0.38	-	mJ
E_{total}	Total Switching Energy			-	1.57	-	mJ
t_{rr}	Diode Reverse Recovery Time	T_J=25°C I_F=20A, dI/dt=200A/µs, V_{CC}=400V		-	143	-	ns
Q_{rr}	Diode Reverse Recovery Charge			-	0.41	-	µC
I_{rm}	Diode Peak Reverse Recovery Current			-	5.08	-	A
SWITCHING PARAMETERS, (Load Inductive, T_J=175°C)							
$t_{D(on)}$	Turn-On DelayTime	T_J=175°C V_{GE}=15V, V_{CC}=400V, I_C=40A, R_G=7.5Ω		-	30	-	ns
t_r	Turn-On Rise Time			-	33	-	ns
$t_{D(off)}$	Turn-Off Delay Time			-	127	-	ns
t_f	Turn-Off Fall Time			-	16	-	ns
E_{on}	Turn-On Energy			-	1.36	-	mJ
E_{off}	Turn-Off Energy			-	0.68	-	mJ
E_{total}	Total Switching Energy			-	2.04	-	mJ
t_{rr}	Diode Reverse Recovery Time	T_J=175°C I_F=20A, dI/dt=200A/µs, V_{CC}=400V		-	204	-	ns
Q_{rr}	Diode Reverse Recovery Charge			-	0.89	-	µC
I_{rm}	Diode Peak Reverse Recovery Current			-	6.9	-	A

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

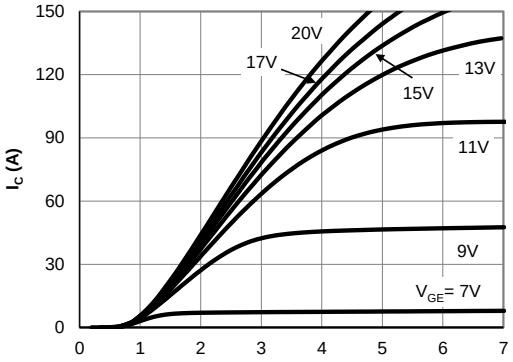


Figure 1: Output Characteristic (T_j=25°C)

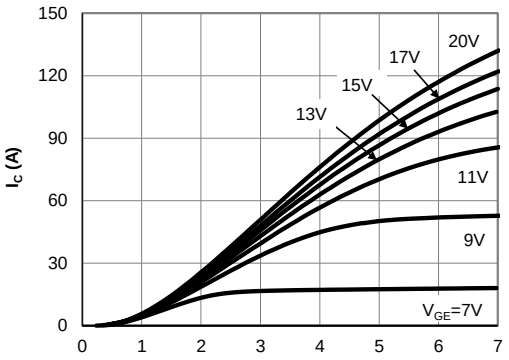


Figure 2: Output Characteristic (T_j=175°C)

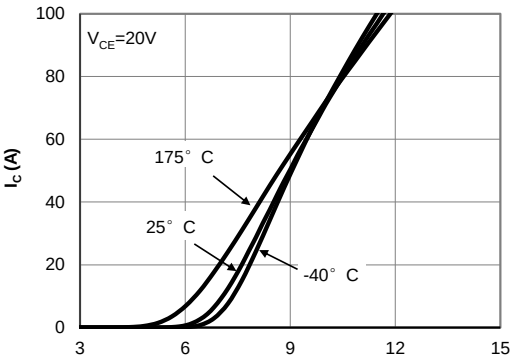


Figure 3: Transfer Characteristic

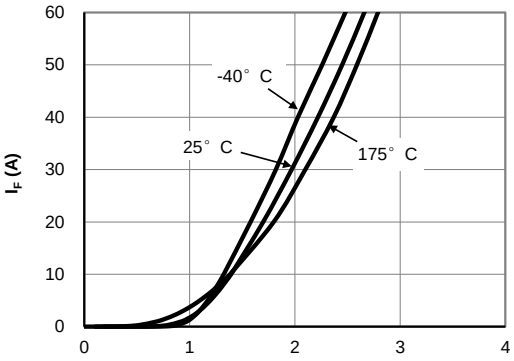


Figure 4: Diode Characteristic

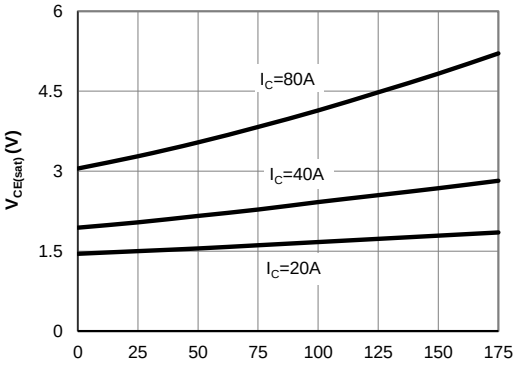


Figure 5: Collector-Emitter Saturation Voltage vs. Junction Temperature

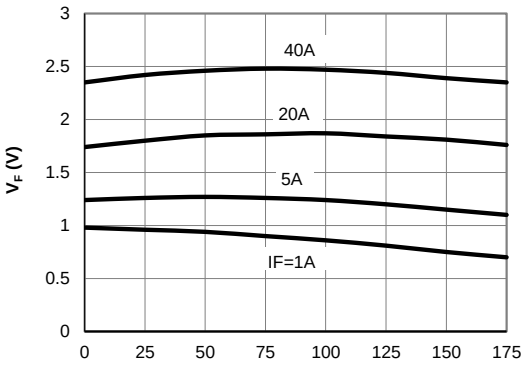


Figure 6: Diode Forward voltage vs. Junction Temperature

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

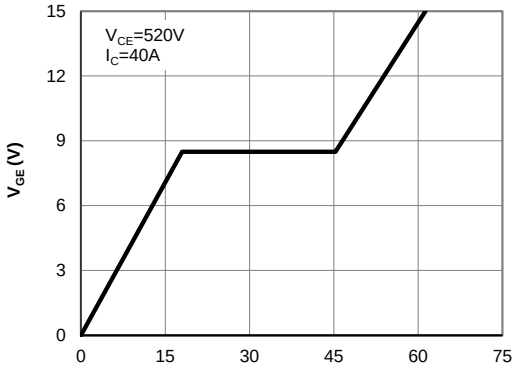


Figure 7: Gate-Charge Characteristics

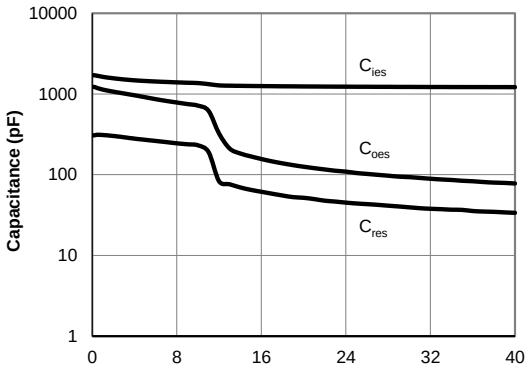


Figure 8: Capacitance Characteristic

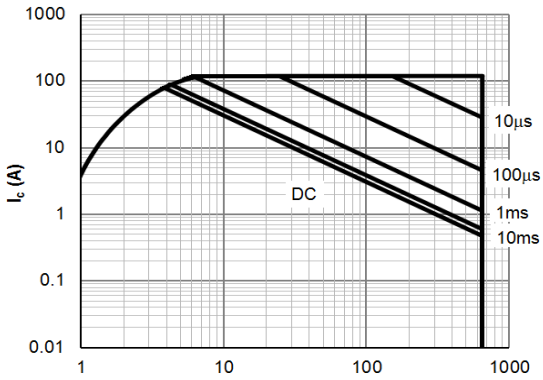


Figure 9: Forward Bias Safe Operating Area (T_C=25°C, V_{GE}=15V)

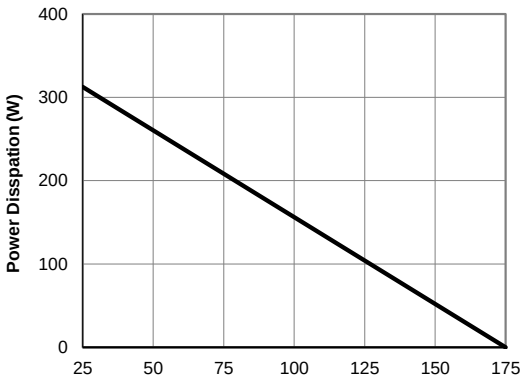


Figure 10: Power Disspation as a Function of Case

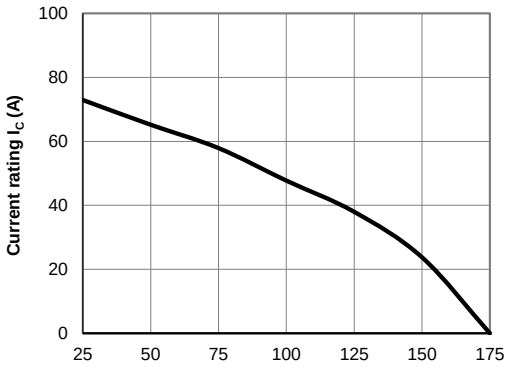


Figure 11: Current De-rating

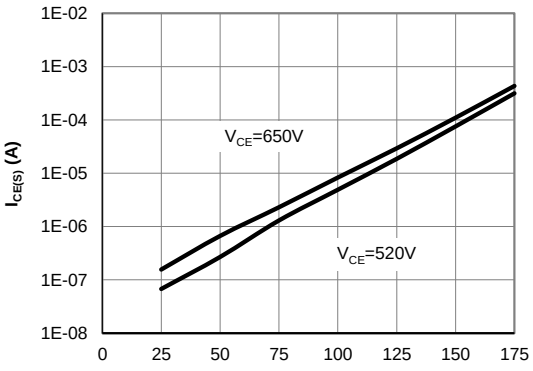


Figure 12: Diode Reverse Leakage Current vs. Junction Temperature

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

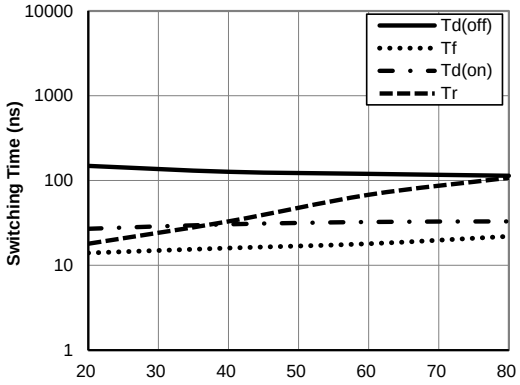


Figure 13: Switching Time vs. I_C
(T_j=175°C, V_{GE}=15V, V_{CE}=400V, R_g=7.5Ω)

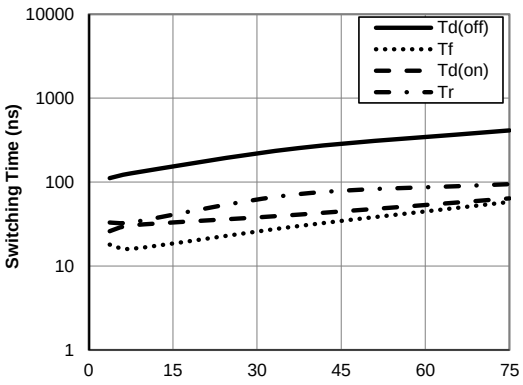


Figure 14: Switching Time vs. R_g
(T_j=175°C, V_{GE}=15V, V_{CE}=400V, I_C=40A)

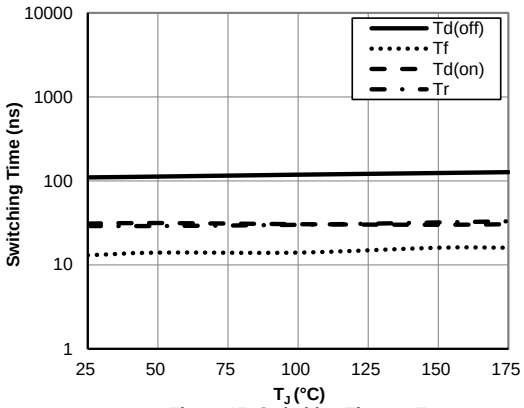


Figure 15: Switching Time vs.T_j
(V_{GE}=15V, V_{CE}=400V, I_C=40A, R_g=7.5Ω)

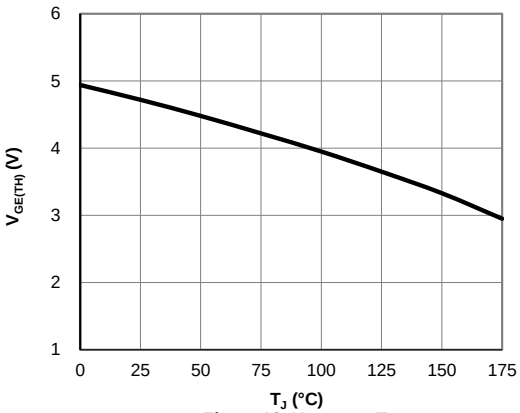


Figure 16: $V_{GE(TH)}$ vs. T_j

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

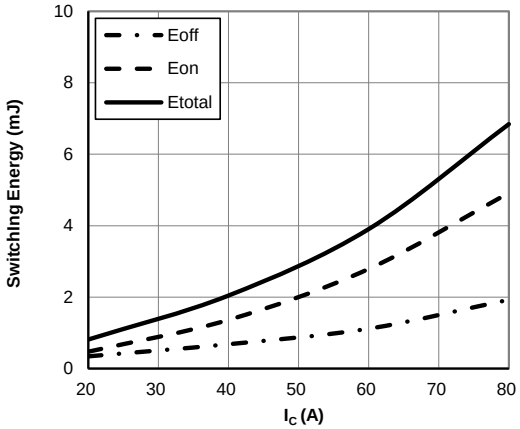


Figure 17: Switching Loss vs. I_C
(T_j=175°C, V_{GE}=15V, V_{CE}=400V, R_g=7.5Ω)

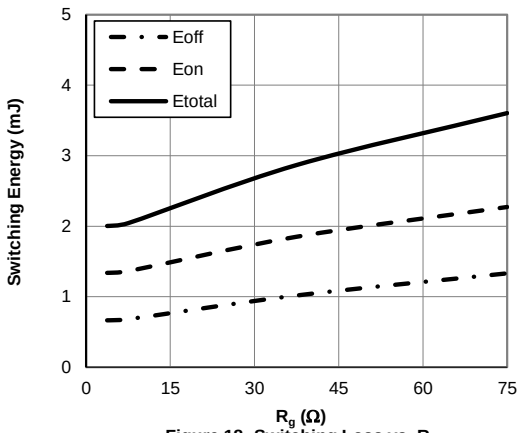


Figure 18: Switching Loss vs. R_g
(T_j=175°C, V_{GE}=15V, V_{CE}=400V, I_C=40A)

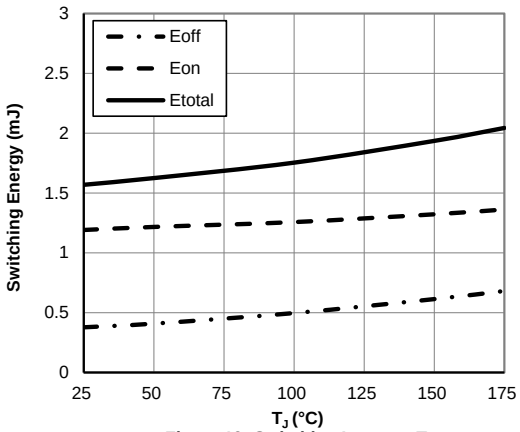


Figure 19: Switching Loss vs. T_j
(V_{GE}=15V, V_{CE}=400V, I_C=40A, R_g=7.5Ω)

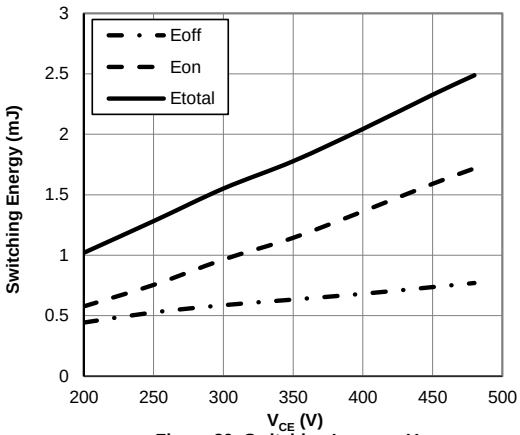


Figure 20: Switching Loss vs. V_{CE}
(T_j=175°C, V_{GE}=15V, I_C=40A, R_g=7.5Ω)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

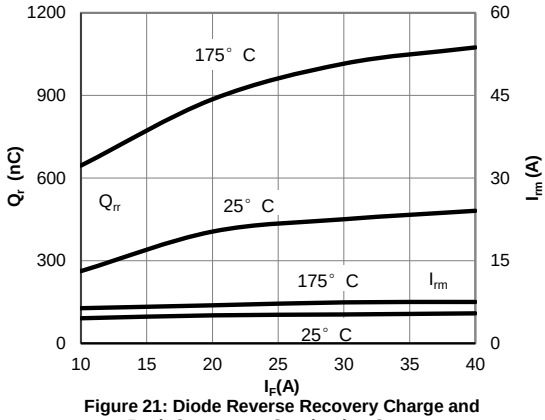


Figure 21: Diode Reverse Recovery Charge and Peak Current vs. Conduction Current (V_{GE}=15V, V_{CE}=400V, di/dt=200A/µs)

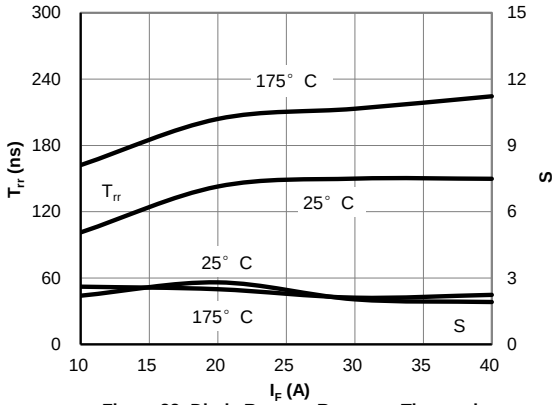


Figure 22: Diode Reverse Recovery Time and Softness Factor vs. Conduction Current (V_{GE}=15V, V_{CE}=400V, di/dt=200A/µs)

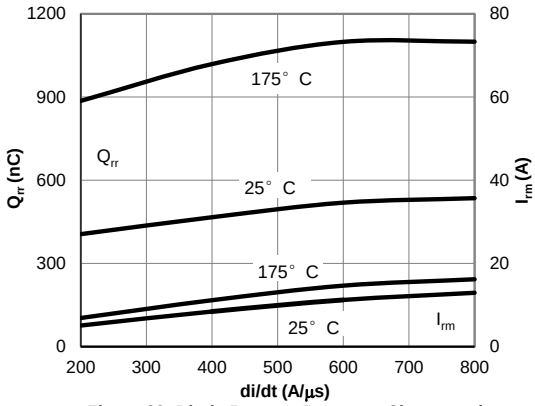


Figure 23: Diode Reverse Recovery Charge and Peak Current vs. di/dt (V_{GE}=15V, V_{CE}=400V, I_F=20A)

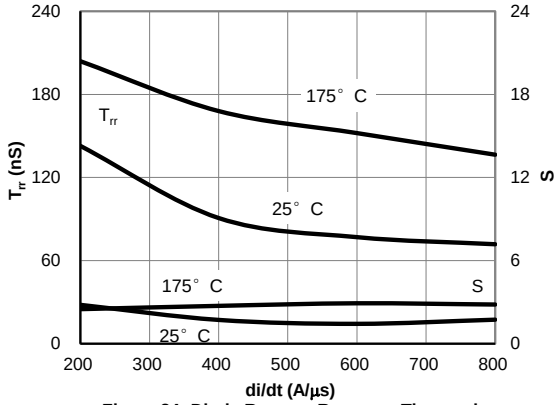


Figure 24: Diode Reverse Recovery Time and Softness Factor vs. di/dt (V_{GE}=15V, V_{CE}=400V, I_F=20A)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

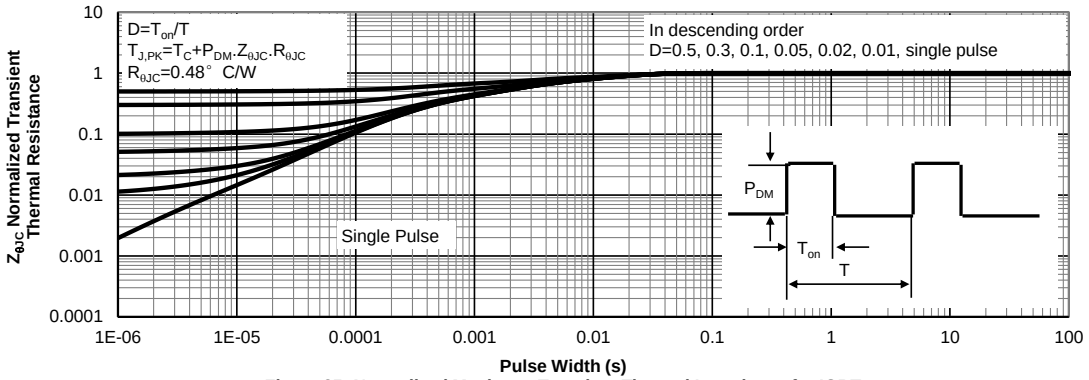


Figure 25: Normalized Maximum Transient Thermal Impedance for IGBT

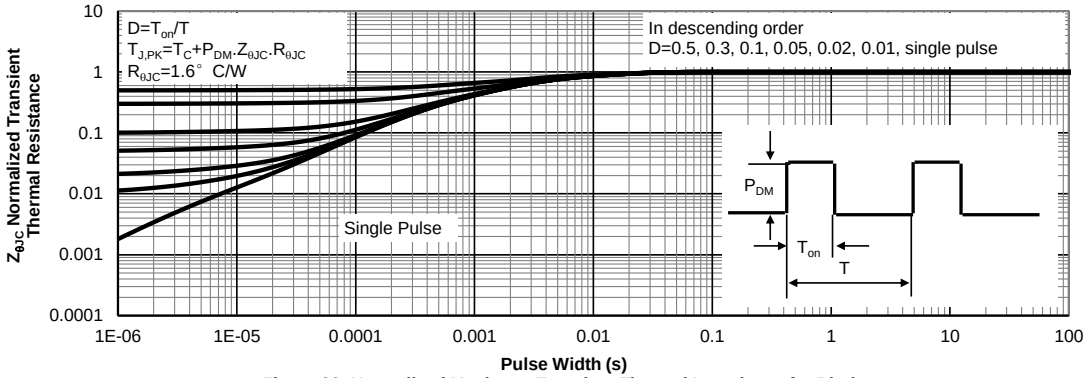


Figure 26: Normalized Maximum Transient Thermal Impedance for Diode

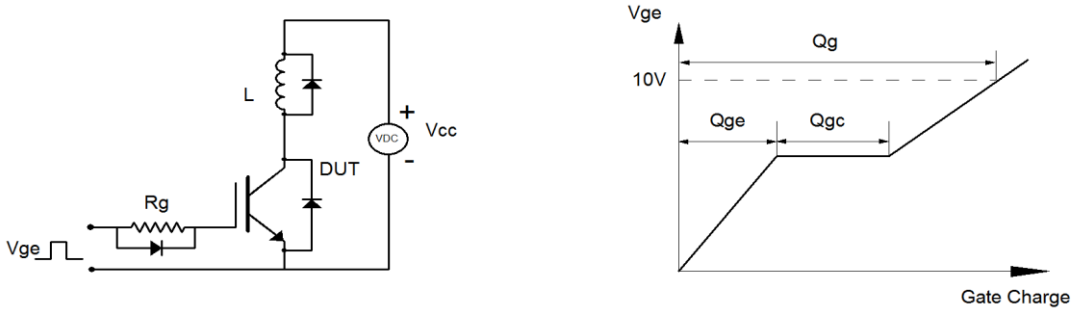


Figure A: Gate Charge Test Circuit & Waveforms

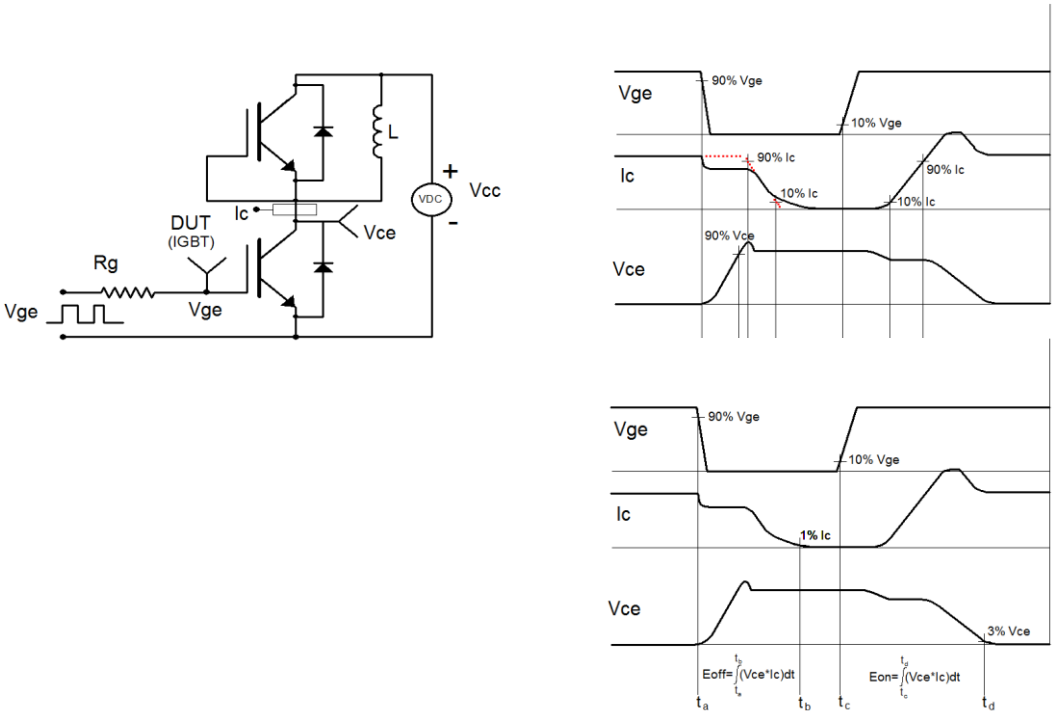


Figure B: Inductive Switching Test Circuit & Waveforms

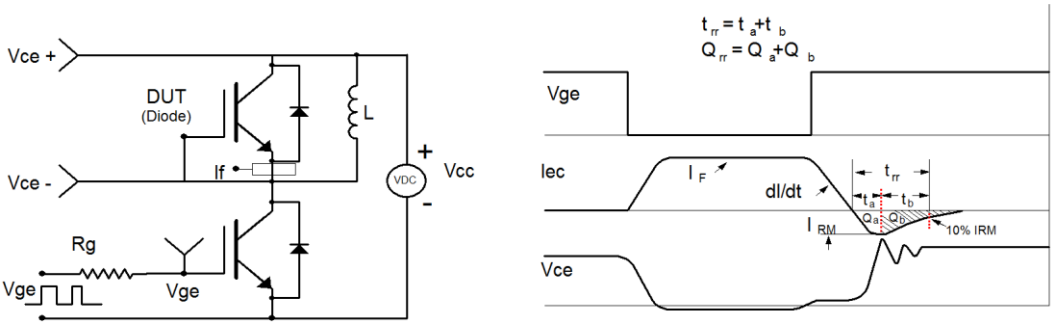


Figure C: Diode Recovery Test Circuit & Waveforms

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Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

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Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

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Üreticileri görün

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