Field Stop Trench IGBT

650 V, 75 A

AFGHL75T65SQD

Using the novel field stop 4th generation high speed IGBT technology. AFGHL75T65SQD which is AEC Q101 qualified offers the optimum performance for both hard and soft switching topology in automotive application.

Features

- AEC−Q101 Qualified
- Maximum Junction Temperature: T_J = 175°C
- Positive Temperature Co−efficient for Easy Parallel Operating
- High Current Capability
- Low Saturation Voltage: $V_{CE(Sat)}$ = 1.6 V (Typ.) @ I_C = 75 A
- 100% of the Parts are Tested for I_{LM} (Note 2)
- Fast Switching
- Tight Parameter Distribution
- RoHS Compliant

Typical Applications

- Automotive HEV−EV Onboard Chargers
- Automotive HEV−EV DC−DC Converters
- Totem Pole Bridgeless PFC

MAXIMUM RATINGS

Rating	Symbol	Value

THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Thermal resistance junction−to−case, for IGBT	$R_{\theta JC}$	0.4	°C/W
Thermal resistance junction−to−case, for Diode	$R_{\theta JC}$	0.65	°C/W
Thermal resistance junction−to−ambient	$R_{\theta JA}$	40	°C/W

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector−emitter breakdown voltage, gate−emitter short−circuited	V_{GE} = 0 V, I_C = 1 mA	BV_{CES}	650	−	−	V
Temperature Coefficient of Breakdown Voltage	V_{GE} = 0 V, I_C = 1 mA	$\frac{\Delta BV_{CES}}{\Delta T_J}$	−	0.6	−	V/°C
Collector−emitter cut−off current, gate−emitter short−circuited	V_{GE} = 0 V, V_{CE} = 650 V	I_{CES}	−	−	250	μA
Gate leakage current, collector−emitter short−circuited	V_{GE} = 20 V, V_{CE} = 0 V	I_{GES}	−	−	±400	nA
ON CHARACTERISTICS						
Gate−emitter threshold voltage	V_{GE} = V_{CE}, I_C = 75 mA	$V_{GE(th)}$	3.4	4.9	6.4	V
Collector−emitter saturation voltage	V_{GE} = 15 V, I_C = 75 A V_{GE} = 15 V, I_C = 75 A, T_J = 175°C	$V_{CE(sat)}$	− −	1.6 1.95	2.1 −	V
DYNAMIC CHARACTERISTICS						
Input capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	C_{ies}	−	4617	−	pF
Output capacitance		C_{oes}	−	152	−	
Reverse transfer capacitance		C_{res}	−	13	−	
Gate charge total	V_{CE} = 400 V, I_C = 75 A, V_{GE} = 15 V	Q_g	−	136	−	nC
Gate−to−emitter charge		Q_{ge}	−	25	−	
Gate−to−collector charge		Q_{gc}	−	32	−	
SWITCHING CHARACTERISTICS, INDUCTIVE LOAD						
Turn−on delay time	T_C = 25°C, V_{CC} = 400 V, I_C = 37.5 A, R_G = 4.7 Ω, V_{GE} = 15 V, Inductive Load	$t_{d(on)}$	−	23	−	ns
Rise time		t_r	−	17	−	
Turn−off delay time		$t_{d(off)}$	−	112	−	
Fall time		t_f	−	8	−	
Turn−on switching loss		E_{on}	−	0.61	−	mJ
Turn−off switching loss		E_{off}	−	0.21	−	
Total switching loss		E_{ts}	−	0.82	−	
Turn−on delay time	T_C = 25°C, V_{CC} = 400 V, I_C = 75 A, R_G = 4.7 Ω, V_{GE} = 15 V, Inductive Load	$t_{d(on)}$	−	25	−	ns
Rise time		t_r	−	46	−	
Turn−off delay time		$t_{d(off)}$	−	106	−	
Fall time		t_f	−	67	−	
Turn−on switching loss		E_{on}	−	1.86	−	mJ
Turn−off switching loss		E_{off}	−	1.13	−	
Total switching loss		E_{ts}	−	2.99	−	

ELECTRICAL CHARACTERISTICS (T

AFGHL75T65SQD

TYPICAL CHARACTERISTICS (CONTINUED)

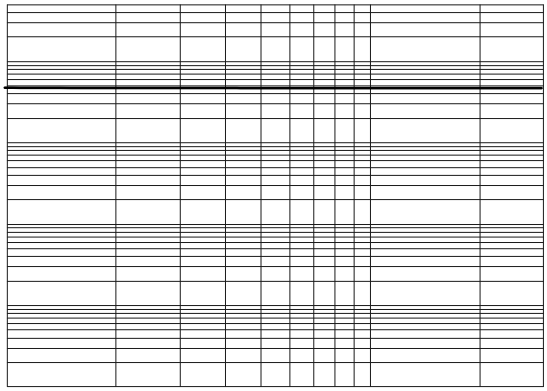


Figure 7. Capacitance Characteristics

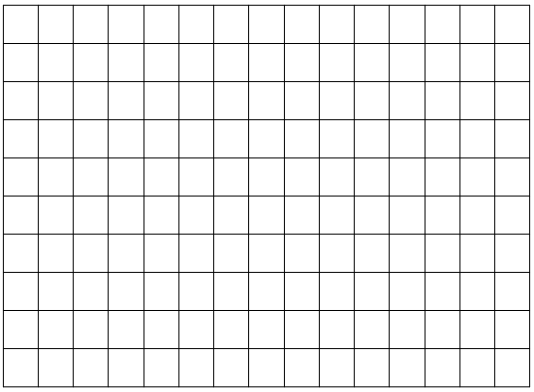


Figure 8. Gate Charge Characteristics

Figure 9. Turn−On Characteristics vs. Gate Resistance

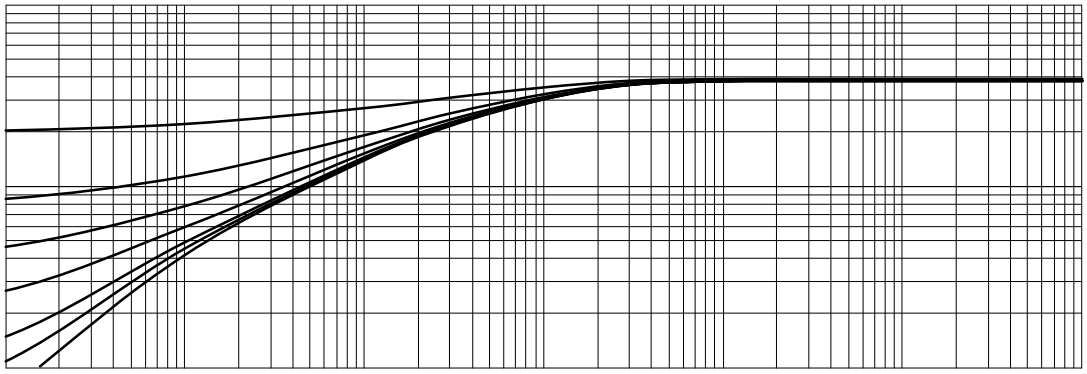
Figure 10. Turn−Off Characteristics vs. Gate Resistance

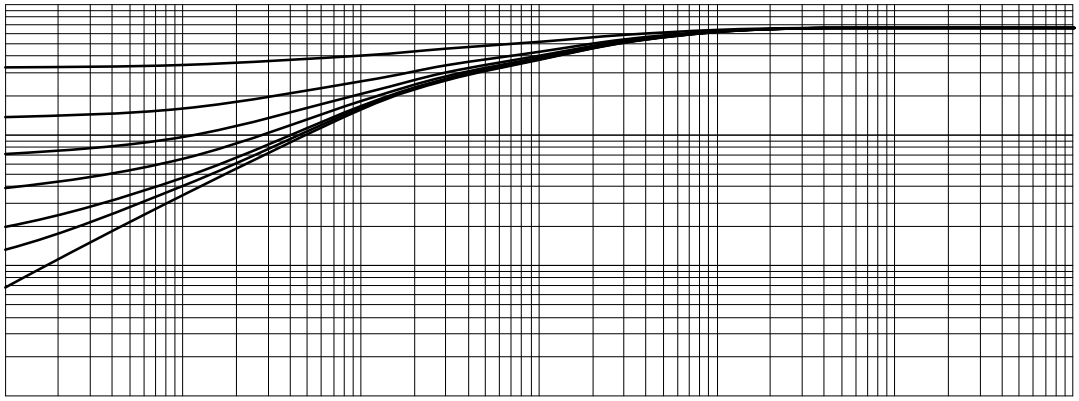
Figure 11. Turn−On Characteristics vs. Collector Current

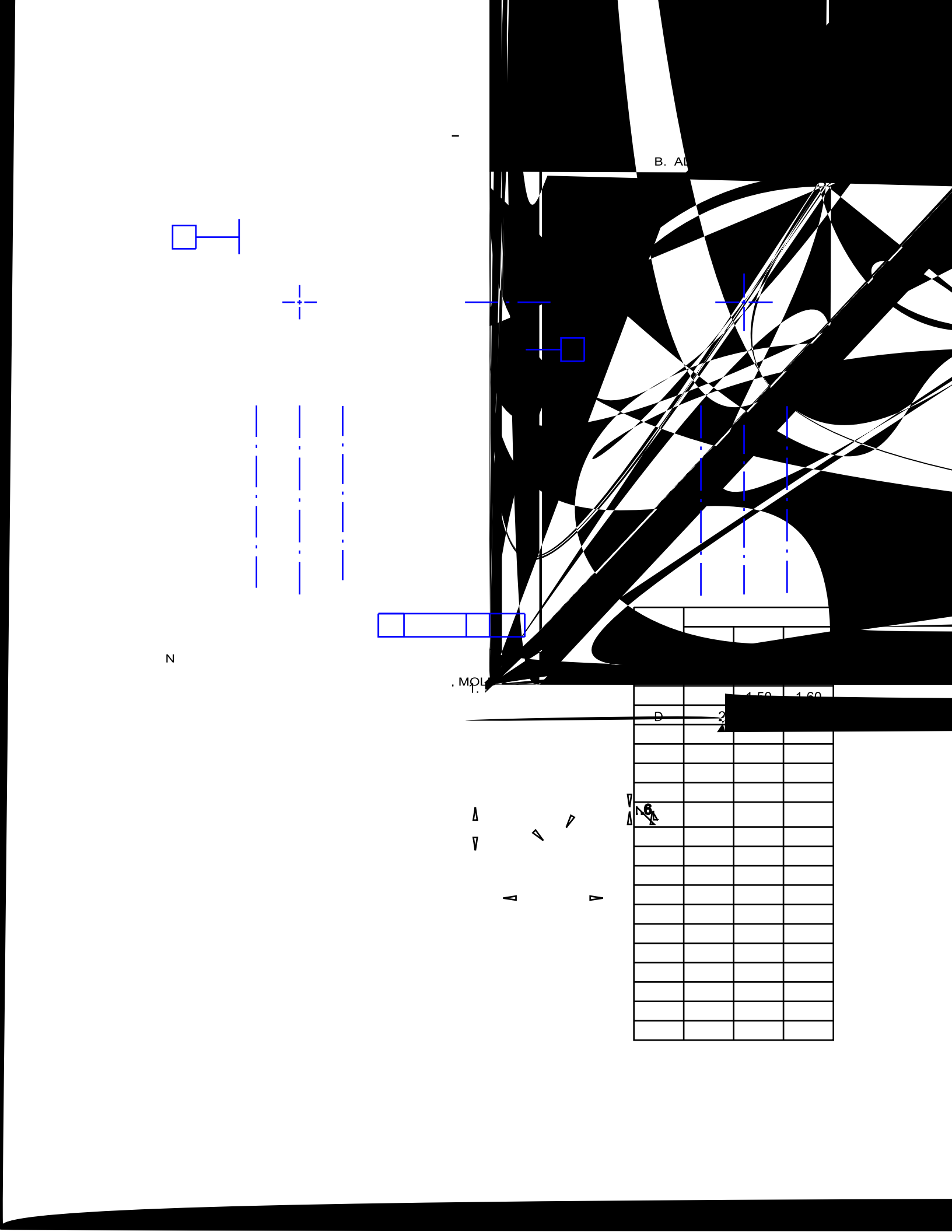
Figure 12. Turn−Off Characteristics vs. Collector Current

TYPICAL CHARACTERISTICS (CONTINUED)

Figure 19. Stored Charge






B. Al
N
, MOL
1.50
1.60
D
3
6