IGBT f A m i e A lica i n

1200 V, 25 A

AFGHL25T120RHD

Description

This Insulated Gate Bipolar Transistor (IGBT) features a robust and cost effective Field Stop II Trench construction. Provides superior performance in demanding switching applications, offering both low on state voltage and minimal switching loss, which is AEC Q101 qualified offer the optimum performance for both hard and soft switching topology in automotive application.

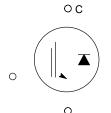
Features

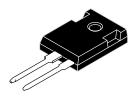
- Extremely Efficient Trench with Field Stop Technology
- Maximum Junction Temperature: $T_J = 175^{\circ}C$
- Short Circuit Withstand Time 8 µs
- 100% of the Parts Tested for I_{LM} (Note 2)
- Fast Switching
- Tighten Parameter Distribution
- AEC-Q101 Qualified and PPAP Capable
- This Device is Pb–Free, Halogen Free/BFR Free and is RoHS Compliant

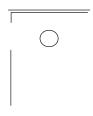
Typical Applications

- Automotive HEV-EV e-compressor
- Automotive HEV–EV PTC heater
- Automotive HEV-EV Onboard Chargers
- Automotive HEV-EV DC-DC Converters









	V
AFG25T120RHD	= Specific Device Code
\$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= 3–Digit Date Code
&K	= 2-Digit Lot Traceability Code

ORDERING INFORMATION

AFGHL25T120RHD TO-247-3L 30 Units / Rail

MAXIMUM RATINGS

Description	Symbol	Value	Units
Collector to Emitter Voltage	V _{CES}	1200	V
Gate to Emitter Voltage	V _{GES}	±20	V
Transient Gate to Emitter Voltage		±30	
Collector Current @ $T_C = 25^{\circ}C$ (Note 1)	Ι _C	48	А
Collector Current @ $T_C = 100^{\circ}C$		25	
Pulsed Collector Current (Note 2)	I _{LM}	100	А
Pulsed Collector Current (Note 3)	I _{CM}	100	А
Diode Forward Current @ $T_C = 25^{\circ}C$ (Note 1)	l _F	48	А
Diode Forward Current @ T _C = 100°C		25	
Pulsed Diode Maximum Forward Current	I _{FM}	100	А
Maximum Power Dissipation @ $T_C = 25^{\circ}C$	PD	261	W
Maximum Power Dissipation @ $T_C = 100^{\circ}C$		130	
Short Circuit Withstand Time V_{GE} = 15 V, V_{CE} = 600 V, T_{J} = 150°C	SCWT	8	μs
Operating Junction Temperature / Storage Temperature Range	T _{J,} T _{STG}	-55 to +175	°C
Maximum Lead Temp. For Soldering Purposes, 1/8" from case for 5 seconds	TL	260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
Value limited by bond wire.
V_{CC} = 600 V, V_{GE} = 15 V, I_C = 100 A, R_G = 15 Ω, Inductive Load, 100% Tested
Repetitive rating: pulse width limited by max. Junction temperature.

THERMAL CHARACTERISTICS

Rating	Symbol	Max.	Units
Thermal Resistance, Junction to Case, for IGBT	$R_{\theta JC}$	0.57	°C/W
Thermal Resistance, Junction to Case, Max for Diode	$R_{ ext{ heta}JC}$	0.63	°C/W
Thermal Resistance, Junction to Ambient, Max	$R_{ extsf{ heta}JA}$	40	°C/W

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

Parameter	Test Conditions	Symbol	Min.	Тур.	Max.	Unit
OFF CHARACTERISTICS						
Collector-emitter Breakdown Voltage, Gate-emitter Short-circuited	V _{GE} = 0 V, I _C = 1mA	BVCES	1250	-	-	V

ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}C$ unless otherwise specified) (continued)

Parameter	Test Conditions	Symbol	Min.	Тур.	Max.	Unit
DYNAMIC CHARACTERISTICS		•		•	•	
Input Capacitance	$V_{CE} = 30 \text{ V}, V_{GE} = 0 \text{ V}, f = 1 \text{ MHz}$	Cies	-	3920	-	pF
Output Capacitance		C _{oes}	-	157	-	
Reverse Transfer Capacitance		Cres	-	71	-	
SWITCHING CHARACTERISTICS		•				
Turn-on Delay Time	$T_J = 25^{\circ}C$	t _{d(on)}	-	26	-	ns
Rise Time	$V_{CC} = 600 \text{ V}, \text{ I}_{C} = 12.5 \text{ A}$ Rg = 5 Ω	t _r	-	10	-	
Turn-off Delay Time	V _{GE} = 15 V Inductive Load	t _{d(off)}	-	133	-	
Fall Time		t _f	-	106	-	
Turn-on Switching Loss		Eon	-	0.9	-	mJ
Turn-off Switching Loss		E _{off}	-	0.44	-	
Total Switching Loss		E _{ts}	-	1.34	-	
Turn-on Delay Time	$T_J = 25^{\circ}C$	t _{d(on)}	-	27	-	ns
Rise Time	$V_{CC} = 600 \text{ V}, \text{ I}_C = 25 \text{ A}$ Rg = 5 Ω	t _r	-	16	-	
Turn-off Delay Time	V _{GE} = 15 V Inductive Load	t _{d(off)}	-	118	-	
Fall Time		t _f	-	101	-	
Turn-on Switching Loss		E _{on}	-	1.94	-	mJ
Turn-off Switching Loss		E _{off}	-	0.77	-	
Total Switching Loss		E _{ts}	-	2.71	-	
Turn–on Delay Time	$T_{J} = 175^{\circ}C$	t _{d(on)}	-	24	-	ns
Rise Time	$V_{CC} = 600 \text{ V}, \text{ I}_{C} = 12.5 \text{ A}$ Rg = 5 Ω	t _r	-	12	-	
Turn-off Delay Time	V _{GE} = 15 V Inductive Load	t _{d(off)}	-	156	-	
Fall Time		t _f	-	280	-	
Turn-on Switching Loss		E _{on}	-	1.42	-	mJ
Turn-off Switching Loss		E _{off}	-	1.03	-	
Total Switching Loss		E _{ts}	-	2.45	-	
Turn-on Delay Time	T _J = 175°C	t _{d(on)}	-	28	-	ns
Rise Time	$V_{CC} = 600 \text{ V}, \text{ I}_{C} = 25 \text{ A}$ Rg = TBD	t _r	-	16	-	mJ
Turn-off Delay Time	V _{GE} = 15 V Inductive Load	t _{d(off)}	-	132	-	
Fall Time		t _f	-	208	-	
Turn-on Switching Loss		Eon	-	2.87	-	
Turn–off Switching Loss		E _{off}	-	1.57	-	
Total Switching Loss		E _{ts}	-	4.44	-	1
Total Gate Charge	V_{CE} = 600 V, I _C = 25 A, V _{GE} = 15 V	Qg	-	189	-	nC
Gate to Emitter Charge		Q _{ge}	_	33	-	1

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TYPICAL CHARACTERISTICS

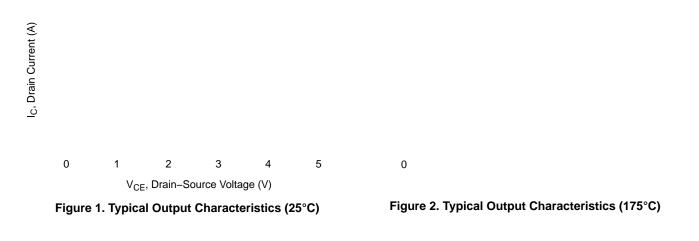


Figure 3. Typical Saturation Voltage Characteristics Figure 4. Saturation Voltage vs. Case Temperature at Variant Current Level

Figure 5. Saturation Voltage vs. V_{GE} (25°C)

Figure 6. Saturation Voltage vs. V_{GE} (175°C)

TYPICAL CHARACTERISTICS (continued)

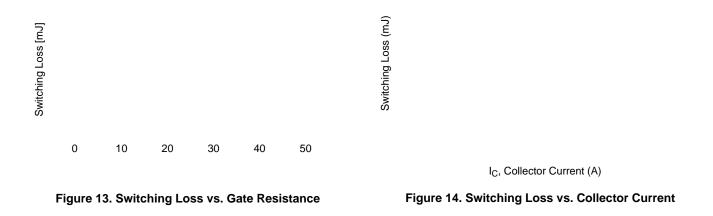


Figure 15. SOA Characteristics

Figure 16. Forward Characteristics

Figure 17. Reverse Recovery Time

Figure 18. Stored Charge

TYPICAL CHARACTERISTICS (continued)

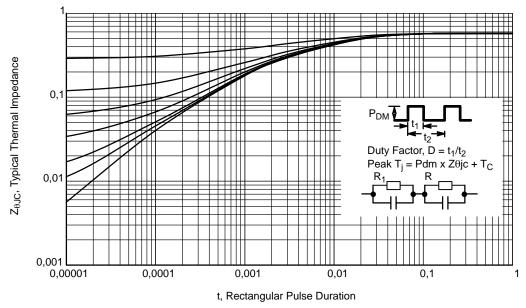
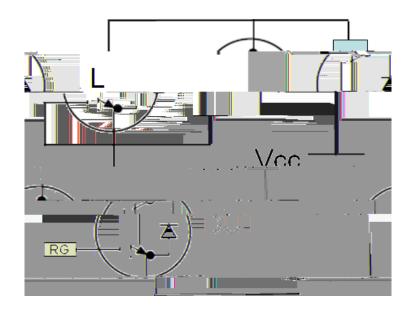


Figure 19. Transient Thermal Impedance of IGBT

t, Rectangular Pulse Duration

Figure 20. Transient Thermal Impedance of Diode



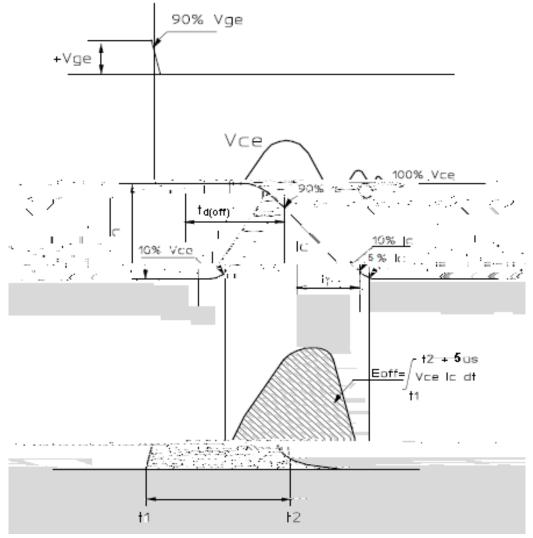
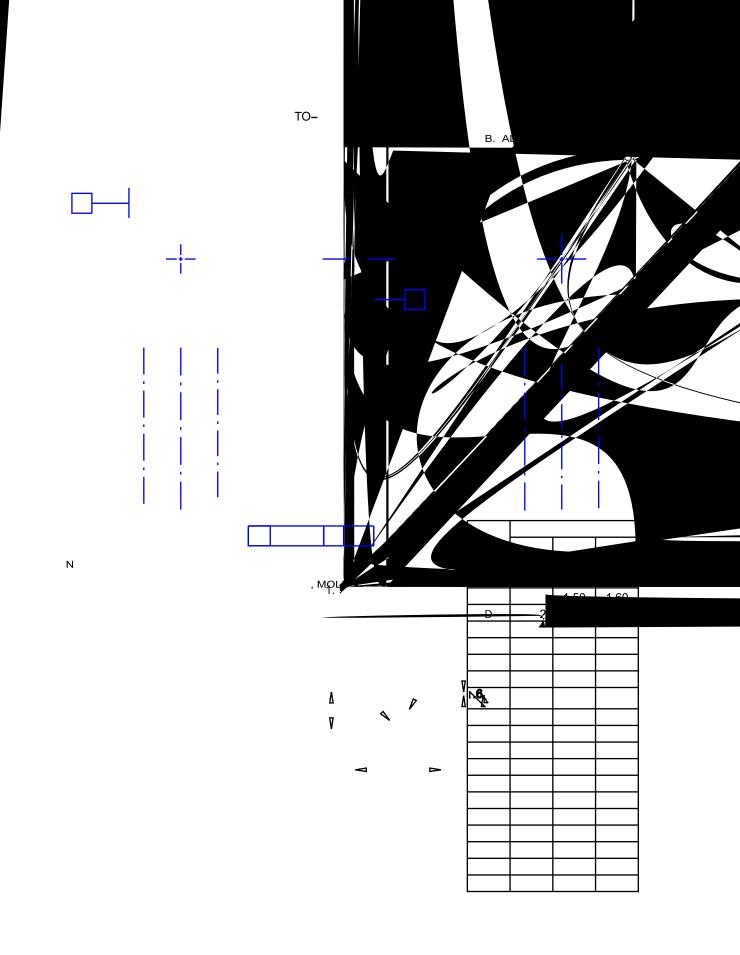


Figure 23. Definition of Turn Off Waveform



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