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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

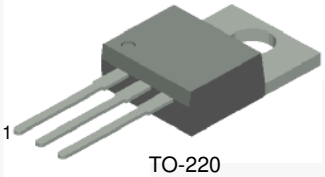
FAIRCHILD SEMICONDUCTOR®

January 2014

KSC5502
NPN Planar Silicon Transistor

Features

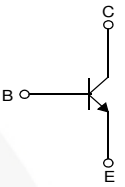
- High-Voltage Power Switch Mode Application
- Small Variance in Storage Time
- Wide Safe Operating Area
- Suitable for Electronic Ballast Application



TO-220

1.Base 2.Collector 3.Emitter

Equivalent Circuit



Ordering Information

Part Number	Marking	Package	Packing Method
KSC5502TU	J5502	TO-220	Tube

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-Base Voltage	1200	V
V_{CEO}	Collector-Emitter Voltage	600	V
V_{EBO}	Emitter-Base Voltage	12	V
I_C	Collector Current (DC)	2	A
I_{CP}	Collector Current (Pulse)[1]	4	A
I_B	Base Current (DC)	1	A
I_{BP}	Base Current (Pulse)[1]	2	A
T_J	Junction Temperature	150	°C
T_{STG}	Storage Junction Temperature Range	-65 to +150	°C
EAS	Avalanche Energy (T_J = 25°C)	2.5	mJ

Notes:

1. Pulse test: pulse width = 5 ms, duty cycle ≤ 10%

Thermal Characteristics

Values are at T_A = 25°C unless otherwise noted.

Symbol	Parameter	Max.	Unit
P_C	Collector Dissipation (T_C = 25°C)	50	W
$R_{\theta JC}$(2)	Thermal Resistance, Junction to Case	2.5	°C/W
$R_{\theta JA}$(3)	Thermal Resistance, Junction to Ambient	85	°C/W

Notes:

2. $R_{\theta JC}$ test fixture under infinite cooling condition.

3. $R_{\theta JA}$ test board and fixture under natural convection, JESD51-10 recommended thermal test board.

Electrical Characteristics(4)

Values are at T_C = 25°C unless otherwise noted.

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
BV_{CBO}	Collector-Base Breakdown Voltage	I_C = 1 mA, I_E = 0		1200	1350		V
BV_{CEO}	Collector-Emitter Breakdown Voltage	I_C = 5 mA, I_B = 0		600	750		V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E = 500 µA, I_C=0		12.0	13.2		V
I_{CES}	Collector Cut-Off Current	V_{CES} = 1200 V, V_{BE} = 0	T_C = 25°C			100	µA
			T_C = 125°C			500	
I_{CEO}	Collector Cut-Off Current	V_{CE} = 600 V, I_B = 0	T_C = 25°C			100	µA
			T_C = 125°C			500	
I_{EBO}	Emitter Cut-Off Current	V_{EB} = 12 V, I_C = 0	T_C = 25°C			10	µA
h_{FE}	DC Current Gain	V_{CE} = 1 V, I_C = 0.2 A	T_C = 25°C	15	28	40	
			T_C = 125°C	8	27		
		V_{CE} = 1 V, I_C = 1 A	T_C = 25°C	4.0	8.7		
			T_C = 125°C	3.0	6.6		
		V_{CE} = 2.5 V, I_C = 0.5 A	T_C = 25°C	12	20	30	
			T_C = 125°C	6	16		
V_{CE}(sat)	Collector-Emitter Saturation Voltage	I_C = 0.2 A, I_B = 0.02 A	T_C = 25°C		0.09	0.80	V
			T_C = 125°C		0.13	1.10	
		I_C = 0.4 A, I_B = 0.08 A	T_C = 25°C		0.08	0.60	
			T_C = 125°C		0.12	1.00	
		I_C = 1 A, I_B = 0.2 A	T_C = 25°C		0.19	1.50	
			T_C = 125°C		0.35	3.00	
V_{BE}(sat)	Base-Emitter Saturation Voltage	I_C = 0.4 A, I_B = 0.08 A	T_C = 25°C		0.77	1.00	V
			T_C = 125°C		0.65	0.90	
		I_C = 1 A, I_B = 0.2 A	T_C = 25°C		0.83	1.20	
			T_C = 125°C		0.70	1.00	
C_{ib}	Input Capacitance	V_{EB} = 8 V, I_C = 0, f = 1 MHz			410	500	pF
C_{ob}	Output Capacitance	V_{CB} = 10 V, I_E = 0, f = 1 MHz			20	100	pF

Note:

4. Pulse test : pulse width = 5 ms, duty cycle ≤ 10%

Electrical Characteristics (Continued)

Values are at T_C = 25°C unless otherwise noted.

Symbol	Parameter	Conditions		Min	Typ.	Max.	Unit
V_{CE}(DSAT)	Dynamic Saturation Voltage	I_C = 0.4 A, I_{B1} = 80 mA, V_{CC} = 300 V	at 1µs		11		V
			at 3µs		8		
		I_C = 1 A, I_{B1} = 200 mA, V_{CC} = 300 V	at 1µs		23		
			at 3µs		13		
Resistive Load Switching (D.C ≤ 10%, Pulse Width = 20 s)							
t_{ON}	Turn-On Time	I_C = 0.4 A, I_{B1} = 80 mA, I_{B2} = 0.2 A, V_{CC} = 300 V, R_L = 750 Ω	T_C = 25°C		250	350	ns
			T_C = 125°C		260		
t_{OFF}	Turn-Off Time		T_C = 25°C		3.3	4.0	µs
			T_C = 125°C		3.8		
t_{ON}	Turn-On Time	I_C = 1 A, I_{B1} = 160 mA, I_{B2} = 160 mA, V_{CC} = 300 V, R_L = 300 Ω	T_C = 25°C		220	450	ns
			T_C = 125°C		250		
t_{OFF}	Turn-Off Time		T_C = 25°C		4.3	5.0	µs
			T_C = 125°C		5.0		
Inductive Load Switching (V_{CC} = 15 V)							
t_{STG}	Storage Time	I_C = 0.4 A, I_{B1} = 80 mA, I_{B2} = 0.2 A, V_Z = 300 V, L_C = 200 µH	T_C = 25°C		1.4	2.0	µs
			T_C = 125°C		1.7		
t_F	Fall Time		T_C = 25°C		130	200	ns
			T_C = 125°C		80		
t_C	Cross-Over Time		T_C = 25°C		210	350	ns
			T_C = 125°C		130		
t_{STG}	Storage Time	I_C = 0.8 A, I_{B1} = 160 mA, I_{B2} = 160 mA, V_{CC} = 300 V, L_C = 200 µH	T_C = 25°C		4.9	5.5	µs
			T_C = 125°C		5.3		
t_F	Fall Time		T_C = 25°C		170	250	ns
			T_C = 125°C		340		
t_C	Cross-Over Time		T_C = 25°C		300	600	ns
			T_C = 125°C		810		

Typical Performance Characteristics

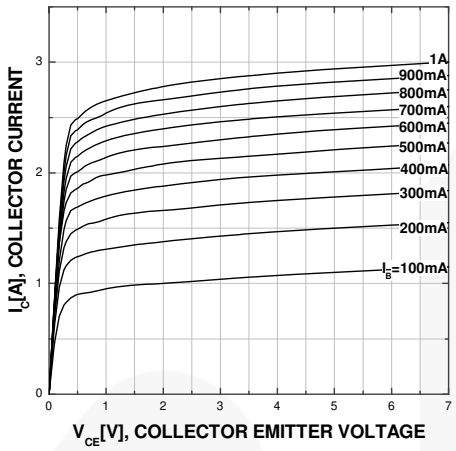


Figure 1. Static Characteristic

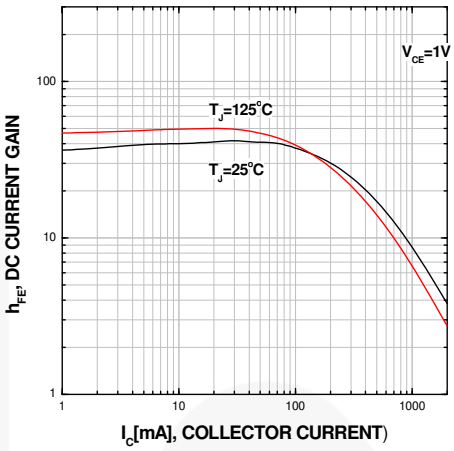


Figure 2. DC current Gain

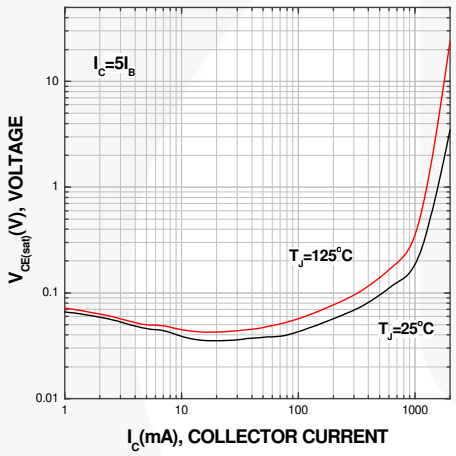


Figure 3. Collector-Emitter Saturation Voltage

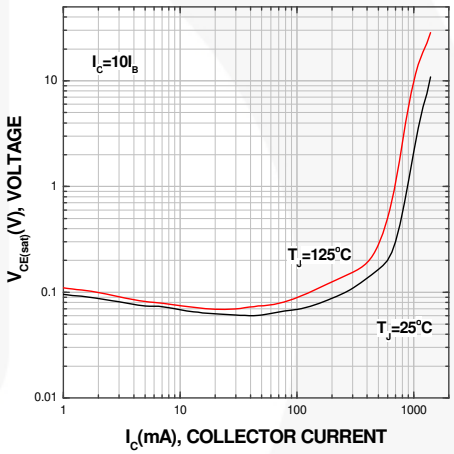


Figure 4. Collector-Emitter Saturation Voltage

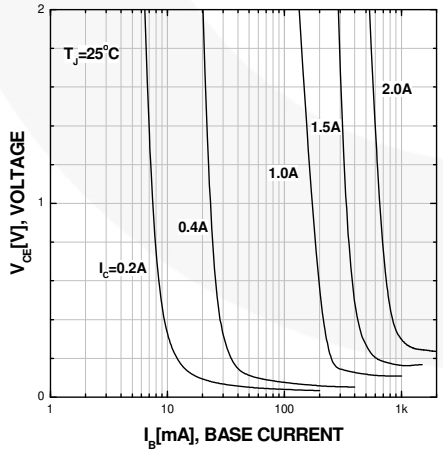


Figure 5. Typical Collector Saturation Voltage

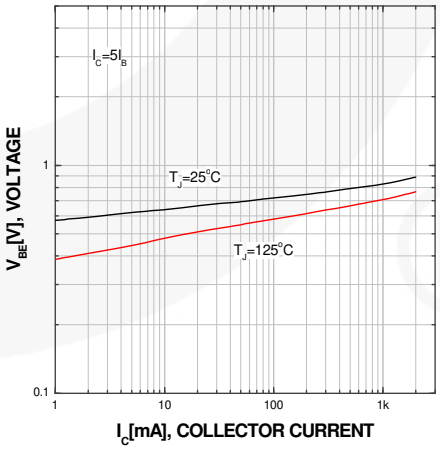


Figure 6. Base-Emitter Saturation Voltage

Typical Performance Characteristics (Continued)

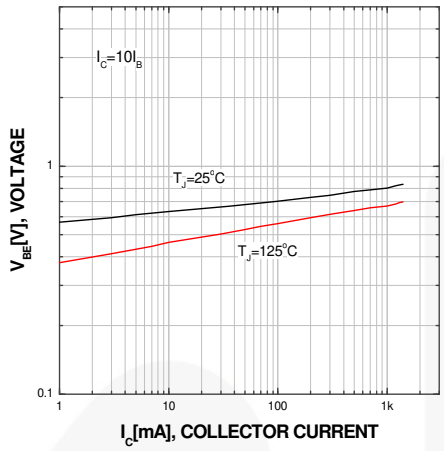


Figure 7. Base-Emitter Saturation Voltage

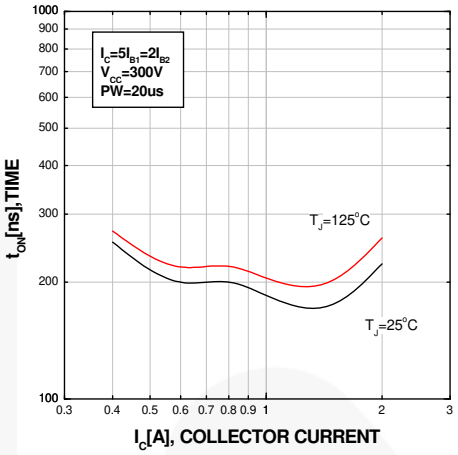


Figure 8. Resistive Switching Time, t_{on}

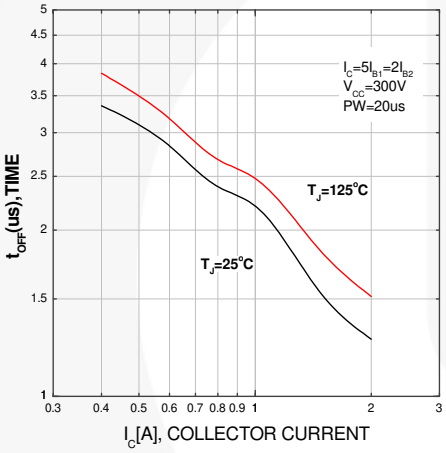


Figure 9. Resistive Switching Time, t_{off}

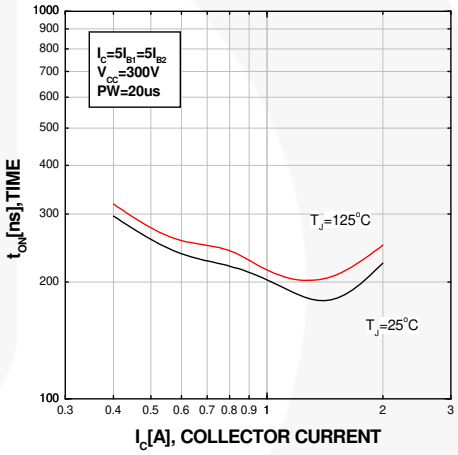


Figure 10. Resistive Switching Time, t_{on}

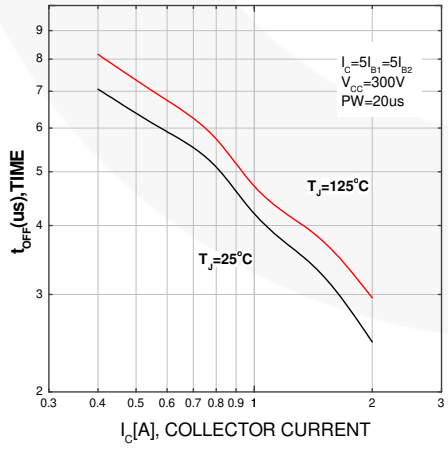


Figure 11. Resistive Switching Time, t_{off}

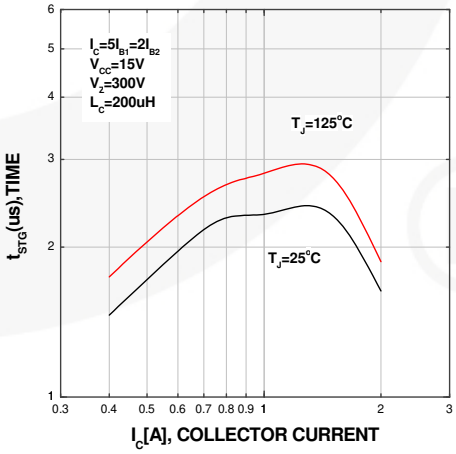


Figure 12. Inductive Switching Time, t_{STG}

Typical Performance Characteristics (Continued)

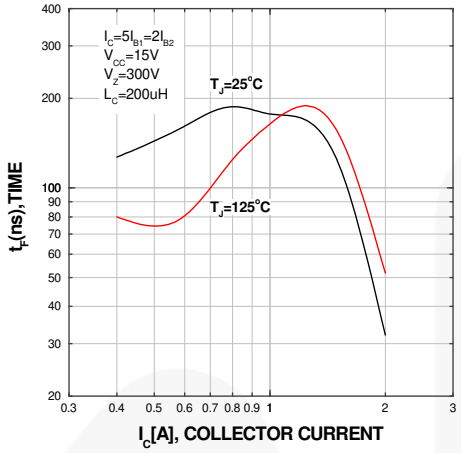


Figure 13. Inductive Switching Time, t_F

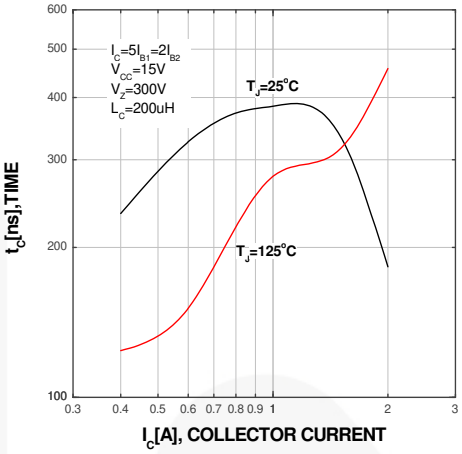


Figure 14. Inductive Switching Time, t_C

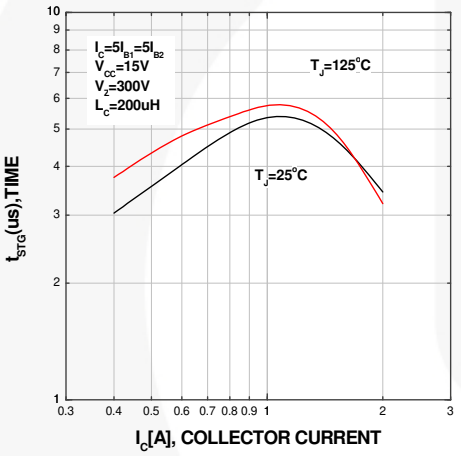


Figure 15. Inductive Switching Time, t_{STG}

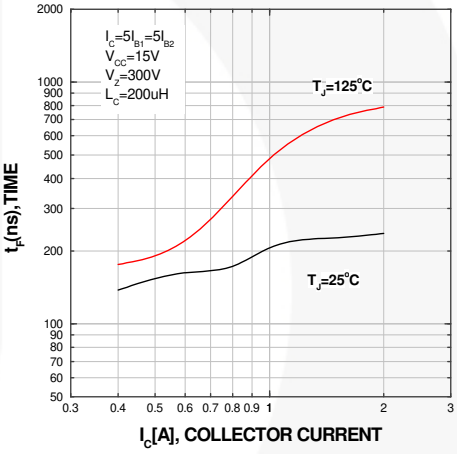


Figure 16. Inductive Switching Time, t_F

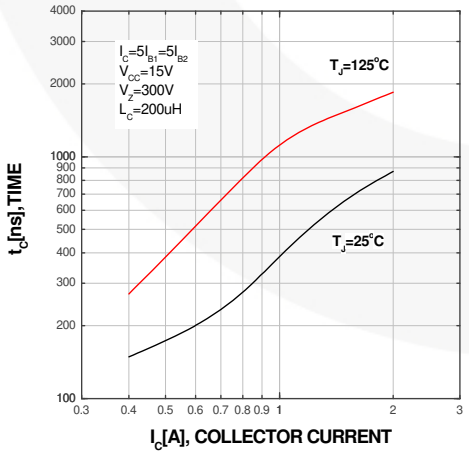


Figure 17. Inductive Switching Time, t_c

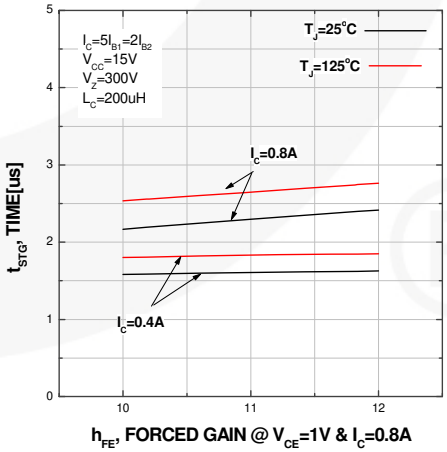


Figure 18. Inductive Switching Time, t_{STG}

Typical Performance Characteristics (Continued)

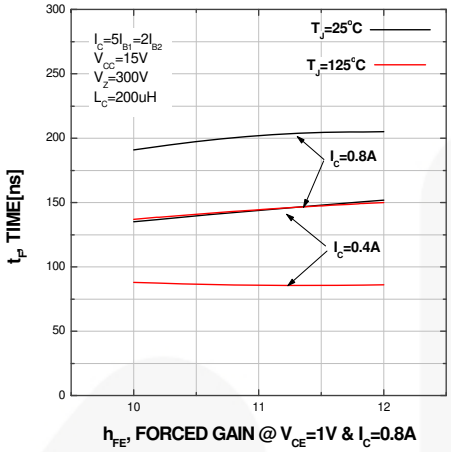


Figure 19. Inductive Switching Time, t_F

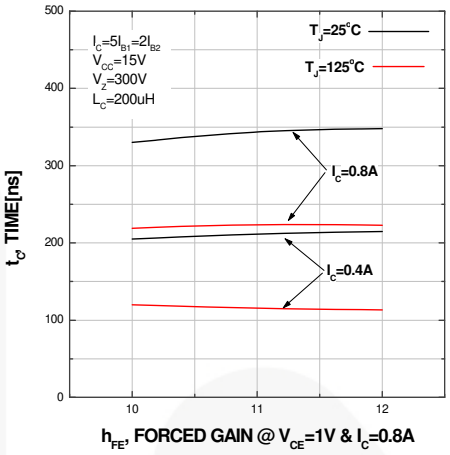


Figure 20. Inductive Switching Time, t_C

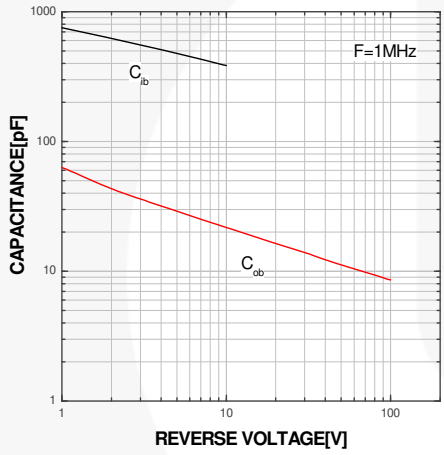


Figure 21. Capacitance

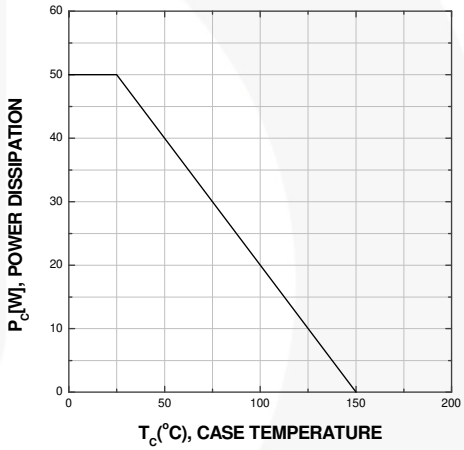


Figure 22. Power Derating

Physical Dimensions

TO-220

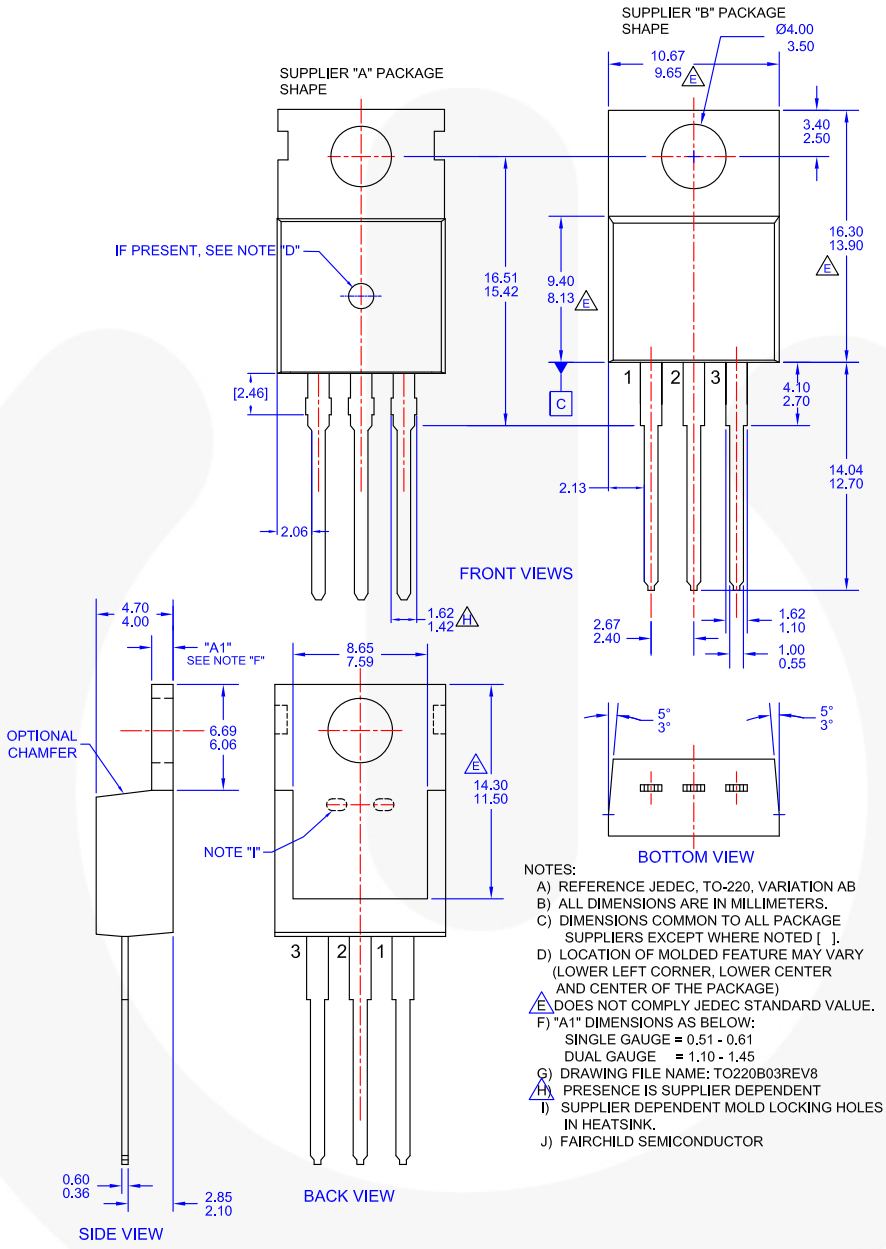


Figure 23. TO-220, MOLDED, 3-LEAD, JEDEC VARIATION AB (ACTIVE)

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PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I66

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