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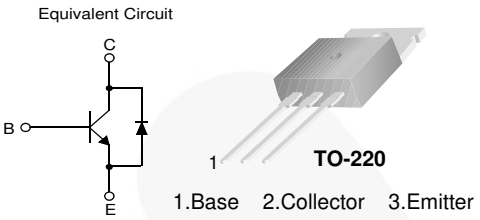
Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes 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.

January 2016

KSC5603D
NPN Silicon Transistor, Planar Silicon Transistor

Features

- High Voltage High Speed Power Switch Application
- Wide Safe Operating Area
- Built-in Free Wheeling Diode
- Suitable for Electronic Ballast Application
- Small Variance in Storage Time



Ordering Information

Part Number	Marking	Package	Packing Method
KSC5603DTU	C5603D	TO-220 3L	Rail

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	1600	V
V_{CEO}	Collector-Emitter Voltage	800	V
V_{EBO}	Emitter-Base Voltage	12	V
I_C	Collector Current (DC)	3	A
I_{CP}	Collector Current (Pulse)(1)	6	A
I_B	Base Current (DC)	2	A
I_{BP}	Base Current (Pulse)(1)	4	A
P_C	Power Dissipation (T_C = 25°C)	100	W
T_J	Junction Temperature	150	°C
T_{STG}	Storage Temperature	-65 to +150	°C

Notes:

1. Pulse test: pulse width = 5 ms, duty cycle $\leq$ 10%

Thermal Characteristics

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

Symbol	Parameter		Rating	Unit
$R_{\theta JC}$	Thermal Resistance	Junction-to-Case	1.25	°C/W
$R_{\theta JA}$		Junction-to-Ambient	80	°C/W
T_L	Maximun Lead Temperature for Soldering Purpose : 1/8” from Case for 5 seconds		270	°C

Electrical Characteristics

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

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
BV_{CBO}	Collector-Base Breakdown Voltage	I_C = 0.5 mA, I_E = 0		1600	1689		V
BV_{CEO}	Collector-Emitter Breakdown Voltage	I_C = 5 mA, I_B = 0		800	870		V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E = 0.5 mA, I_C = 0		12.0	14.8		V
I_{CES}	Collector Cut-Off Current	V_{CE} = 1600 V, V_{BE} = 0	T_A = 25°C		0.01	100	μA
			T_A = 125°C			1000	
I_{CEO}	Collector Cut-Off Current	V_{CE} = 800 V, I_B = 0	T_A = 25°C		0.01	100	μA
			T_A = 125°C			1000	
I_{EBO}	Emitter Cut-Off Current	V_{EB} = 12 V, I_C = 0			0.05	500	μA
h_{FE}	DC Current Gain	V_{CE} = 3 V, I_C = 0.4 A	T_A = 25°C	20	29	35	
			T_A = 125°C	6	15		
		V_{CE} = 10 V, I_C = 5 mA	T_A = 25°C	20	43		
			T_A = 125°C	20	46		
V_{CE}(sat)	Collector-Emitter Saturation Voltage	I_C = 250 mA, I_B = 25 mA			0.50	1.25	V
		I_C = 500 mA, I_B = 50 mA			1.50	2.50	
		I_C = 1 A, I_B = 0.2 A			1.20	2.50	
V_{BE}(sat)	Base-Emitter Saturation Voltage	I_C = 500 mA, I_B = 50 mA	T_A = 25°C		0.74	1.20	V
			T_A = 125°C		0.61	1.10	
		I_C = 2 A, I_B = 0.4 A	T_A = 25°C		0.85	1.20	
			T_A = 125°C		0.74	1.10	
C_{ib}	Input Capacitance	V_{EB} = 10 V, I_C = 0, f = 1 MHz			745	1000	pF
C_{ob}	Output Capacitance	V_{CB} = 10 V, I_E = 0, f = 1 MHz			56	500	pF
f_T	Current Gain Bandwidth Product	I_C = 0.1 A,V_{CE} = 10 V			5		MHz
V_F	Diode Forward Voltage	I_F = 0.4 A			0.76	1.20	V
		I_F = 1 A			0.83	1.50	

Electrical Characteristics (Continued)

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
RESISTIVE LOAD SWITCHING (D.C ≤ 10%, Pulse Width = 20 μs)						
t_{ON}	Turn-On Time	I_C = 0.3 A, I_{B1} = 50 mA, I_{B2} = 150 A, V_{CC} = 125 V, R_L = 416 Ω		400	600	ns
t_{STG}	Storage Time		2.0	2.1	2.3	μs
t_F	Fall Time			310	1000	ns
t_{ON}	Turn-On Time	I_C = 0.5 A, I_{B1} = 50 mA, I_{B2} = 250 mA, V_{CC} = 125 V, R_L = 250 Ω		600	1100	ns
t_{STG}	Storage Time			1.3	1.5	μs
t_F	Fall Time			180	350	ns
INDUCTIVE LOAD SWITCHING (V_{CC} = 15 V)						
t_{STG}	Storage Time	I_C = 0.3 A, I_{B1} = 50 mA, I_{B2} = 150 mA, V_Z = 300 V, L_C = 200 H	0.60	0.73	0.90	μs
t_F	Fall Time			170	250	ns
t_C	Cross-Over Time			180	250	ns
t_{STG}	Storage Time	I_C = 0.5 A, I_{B1} = 50 mA, I_{B2} = 250 mA, V_Z = 300 V, L_C = 200 H	0.70	0.84	1.00	μs
t_F	Fall Time			140	175	ns
t_C	Cross-Over Time			170	200	ns

Typical Performance Characteristics

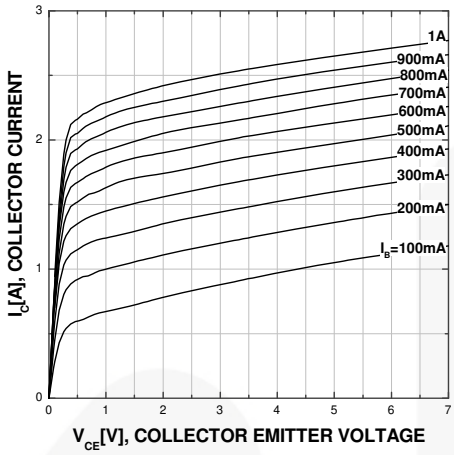


Figure 1. Static Characteristic

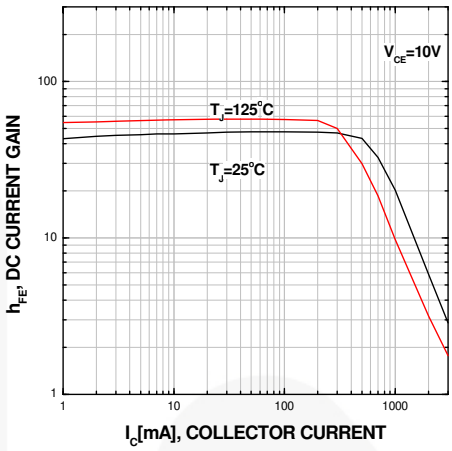


Figure 2. DC Current Gain

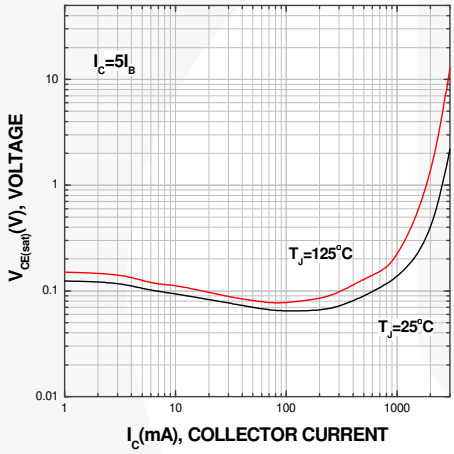


Figure 3. Collector-Emitter Saturation Voltage

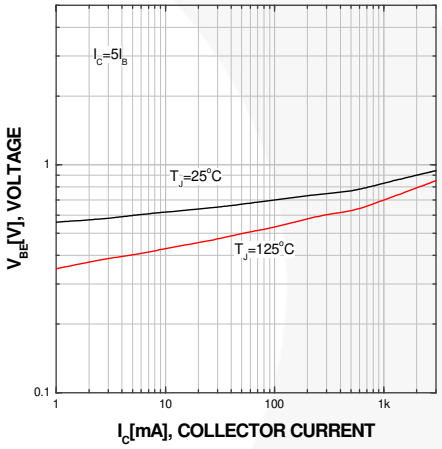


Figure 4. Base-Emitter Saturation Voltage

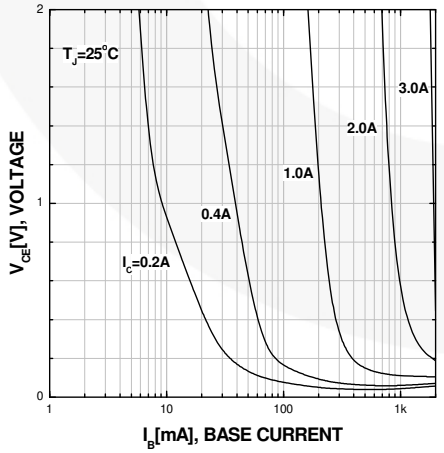


Figure 5. Typical Collector Saturation Voltage

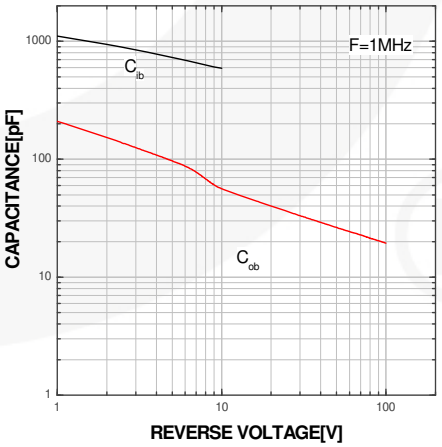


Figure 6. Capacitance

Typical Performance Characteristics (Continued)

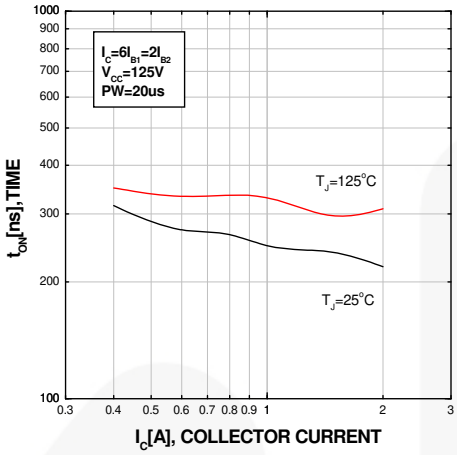


Figure 7. Resistive Switching Time, t_{on}

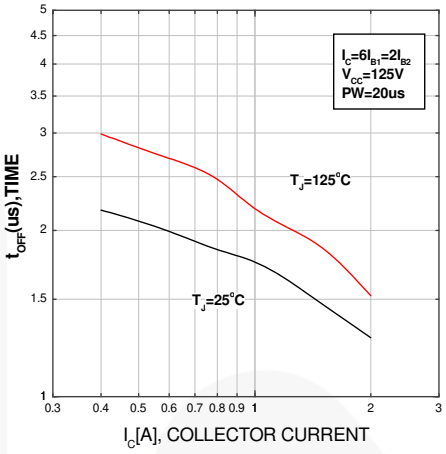


Figure 8. Resistive Switching Time, t_{off}

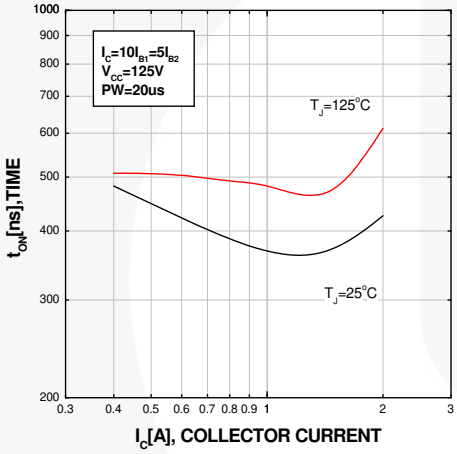


Figure 9. Resistive Switching Time, t_{on}

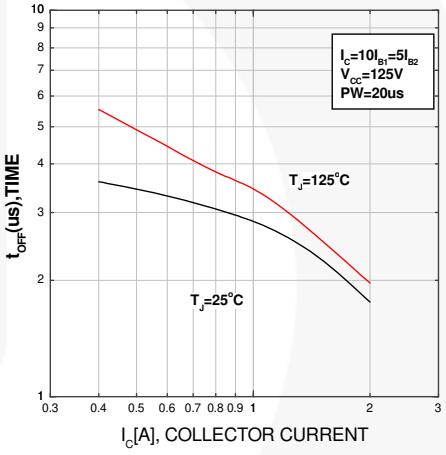


Figure 10. Resistive Switching Time, t_{off}

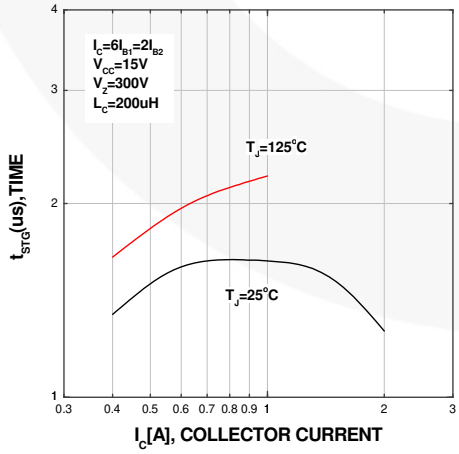


Figure 11. Inductive Switching Time, t_{STG}

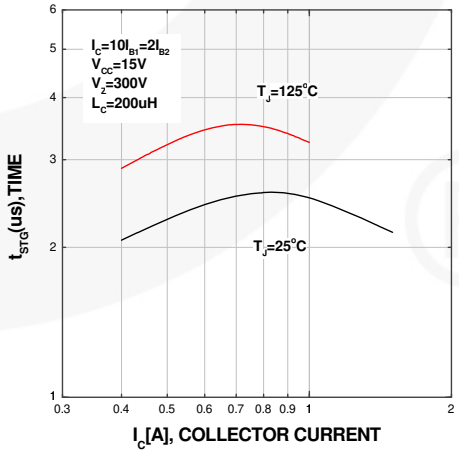


Figure 12. Inductive Switching Time, t_{STG}

Typical Performance Characteristics (Continued)

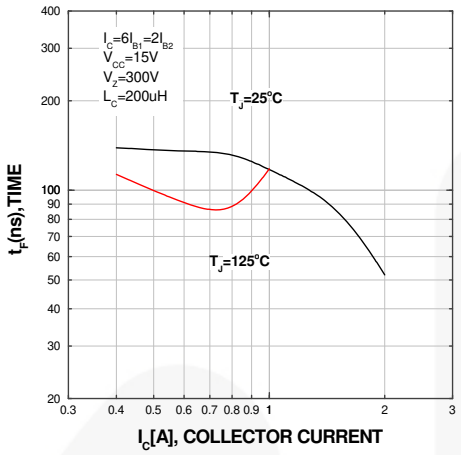


Figure 13. Inductive Switching Time, t_F

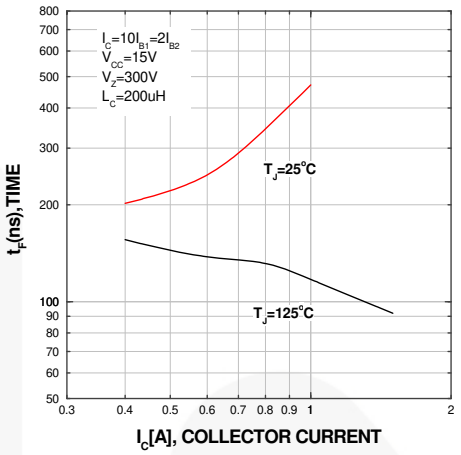


Figure 14. Inductive Switching Time, t_F

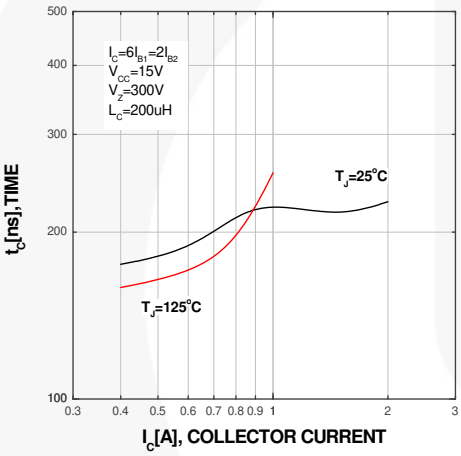


Figure 15. Inductive Switching Time, t_C

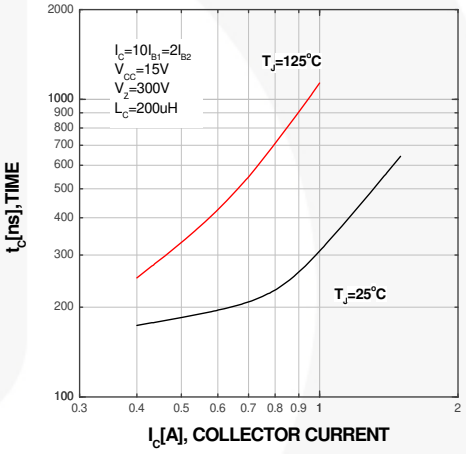


Figure 16. Inductive Switching Time, t_C

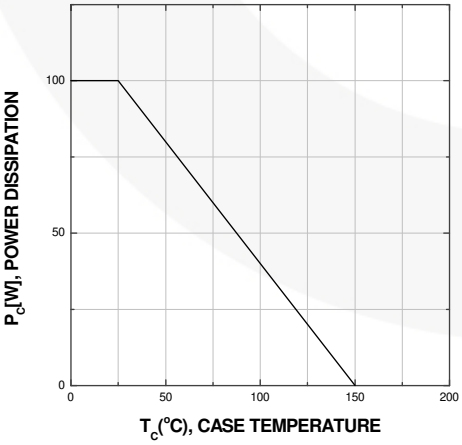
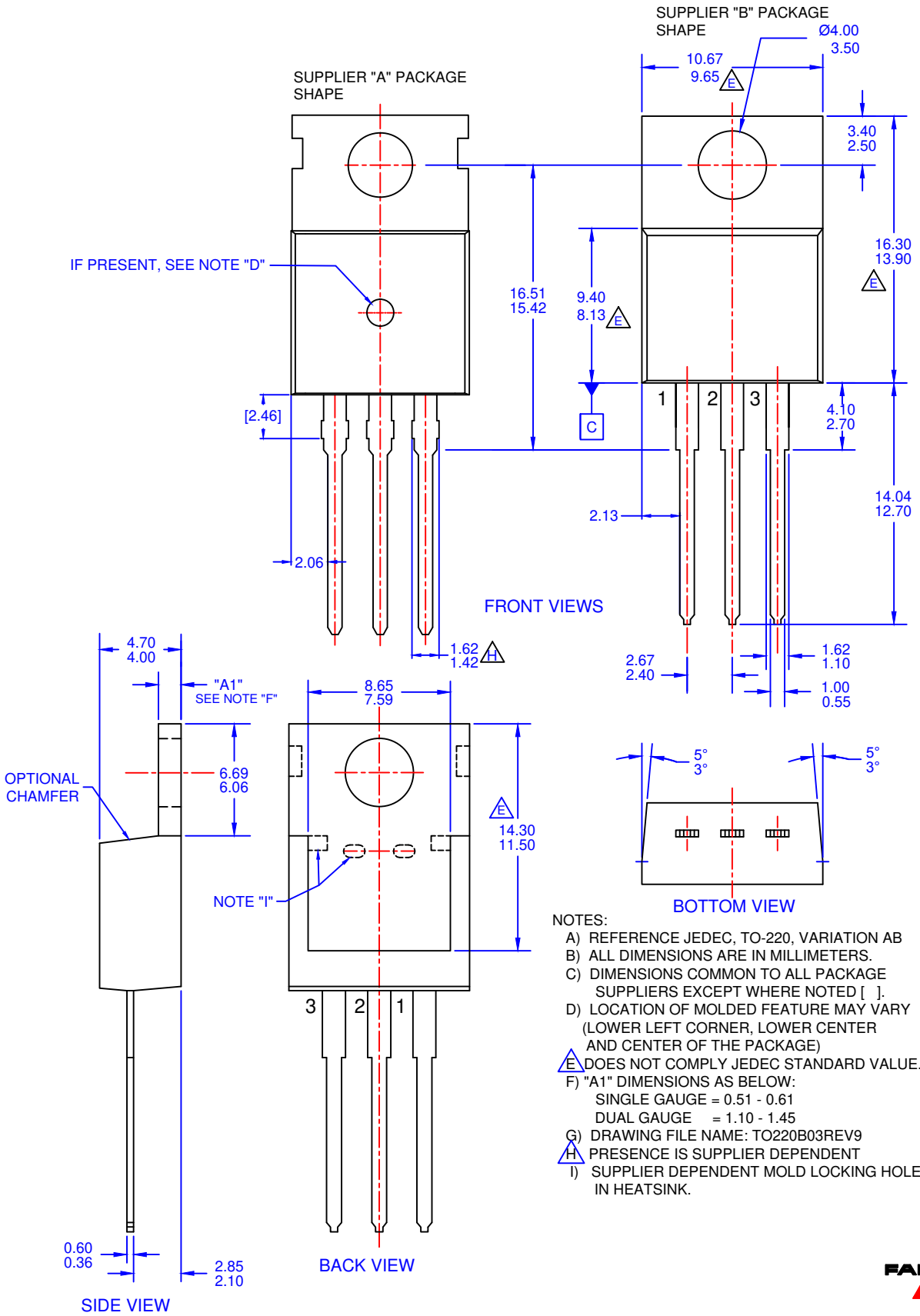


Figure 17. Power Derating



NOTES:

A) REFERENCE JEDEC, TO-220, VARIATION AB
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS COMMON TO ALL PACKAGE SUPPLIERS EXCEPT WHERE NOTED [ ].
D) LOCATION OF MOLDED FEATURE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)
E) DOES NOT COMPLY JEDEC STANDARD VALUE.
F) "A1" DIMENSIONS AS BELOW:
SINGLE GAUGE = 0.51 - 0.61
DUAL GAUGE = 1.10 - 1.45
G) DRAWING FILE NAME: TO220B03REV9
H) PRESENCE IS SUPPLIER DEPENDENT
I) SUPPLIER DEPENDENT MOLD LOCKING HOLES IN HEATSINK.

FAIRCHILD

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