FAIRCHILD SEMICONDUCTOR®

October 2013

FGB3236_F085 / FGI3236_F085

EcoSPARKÈ 320mJ, 360V, N-Channel Ignition IGBT

Features

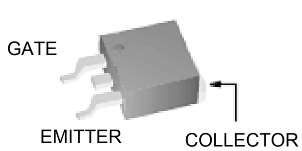
- Industry Standard D^2-Pak package
- SCIS Energy = 320mJ at T_J = 25°C
- Logic Level Gate Drive
- Qualified to AEC Q101
- RoHS Compliant

Applications

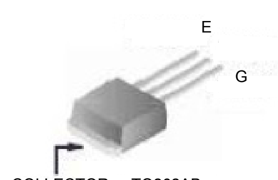
- Automotive Ignition Coil Driver Circuits
- Coil On Plug Applications

100% RoHS COMPLIANT

Package

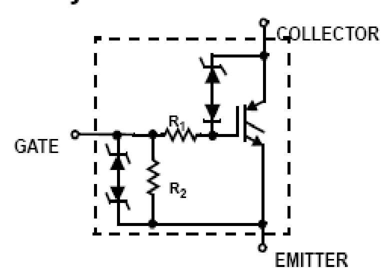


JEDEC TO-263AB
D^2-Pak



TO262AB
FDI SERIES

Symbol



Device Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
BV_{CER}	Collector to Emitter Breakdown Voltage (I_C = 1mA)	360	V
BV_{ECS}	Emitter to Collector Voltage - Reverse Battery Condition (I_C = 10mA)	24	V
E_{SCIS25}	Self Clamping Inductive Switching Energy (I_{SCIS} = 14.7A, L = 3.0mHy, T_J = 25°C)	320	mJ
$E_{SCIS150}$	Self Clamping Inductive Switching Energy (I_{SCIS} = 10.4A, L = 3.0mHy, T_J = 150°C)	160	mJ
I_{C25}	Collector Current Continuous, at V_{GE} = 4.0V, T_C = 25°C	44	A
I_{C110}	Collector Current Continuous, at V_{GE} = 4.0V, T_C = 110°C	27	A
V_{GEM}	Gate to Emitter Voltage Continuous	±10	V
P_D	Power Dissipation Total, at T_C = 25°C	187	W
	Power Dissipation Derating, for T_C > 25°C	1.25	W/°C
T_J	Operating Junction Temperature Range	-40 to +175	°C
T_{STG}	Storage Junction Temperature Range	-40 to +175	°C
T_L	Max. Lead Temp. for Soldering (Leads at 1.6mm from case for 10s)	300	°C
T_{PKG}	Max. Lead Temp. for Soldering (Package Body for 10s)	260	°C
ESD	Electrostatic Discharge Voltage at100pF, 1500Ω	4	kV

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGB3236	FGB3236_F085	TO263	330mm	24mm	800 units
FGI3236	FGI3236_F085	TO262	Tube	NA	50 units

Electrical Characteristics T_A = 25°C unless otherwise noted

Off State Characteristics

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
BV_{CER}	Collector to Emitter Breakdown Voltage	I_{CE} = 2mA, V_{GE} = 0, R_{GE} = 1KΩ, See Fig. 15 T_J = -40 to 150°C		330	363	390	V
BV_{CES}	Collector to Emitter Breakdown Voltage	I_{CE} = 10mA, V_{GE} = 0V, R_{GE} = 0, T_J = -40 to 150°C		350	378	410	V
BV_{ECS}	Emitter to Collector Breakdown Voltage	I_{CE} = -75mA, V_{GE} = 0V, T_C = 25°C		30	-	-	V
BV_{GES}	Gate to Emitter Breakdown Voltage	I_{GES} = ±2mA		±12	±14	-	V
I_{CES}	Collector to Emitter Leakage Current	V_{CES} = 250V, See Fig. 11	T_C = 25°C	-	-	25	µA
			T_C = 150°C	-	-	1	mA
I_{ECS}	Emitter to Collector Leakage Current	V_{EC} = 24V, See Fig.11	T_C = 25°C	-	-	1	mA
			T_C = 150°C	-	-	40	
R_1	Series Gate Resistance			-	100	-	Ω
R_2	Gate to Emitter Resistance			10K	-	30K	Ω

On State Characteristics

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	I_{CE} = 6A, V_{GE} = 4V,	T_C=25°C, See Fig. 3	-	1.14	1.4	V
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	I_{CE} = 10A, V_{GE} = 4.5V,	T_C = 150°C, See Fig. 4	-	1.32	1.7	V
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	I_{CE} = 15A, V_{GE} = 4.5V,	T_C = 150°C	-	1.61	2.05	V
$I_{CE(ON)}$	Collector to Emitter On State Current	V_{GE} = 5V, V_{CE} = 5V		50	-	-	A

Electrical Characteristics T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units

Dynamic Characteristics

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
$Q_{G(ON)}$	Gate Charge	I_{CE} = 10A, V_{CE} = 12V, V_{GE} = 5V, See Fig.14		-	20	-	nC
$V_{GE(TH)}$	Gate to Emitter Threshold Voltage	I_{CE} = 1mA, V_{CE} = $V_{GE,}$ See Fig. 10	T_C = 25°C	1.3	1.6	2.2	V
			T_C = 150°C	0.75	1.1	1.8	
V_{GEP}	Gate to Emitter Plateau Voltage	V_{CE} = 12V, I_{CE} = 10A		-	2.6	-	V

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(ON)R}$	Current Turn-On Delay Time-Resistive	V_{CE} = 14V, R_L = 1Ω, V_{GE} = 5V, R_G = 1KΩ, T_J = 25°C, See Fig.12	-	0.65	4	μs
t_{rR}	Current Rise Time-Resistive		-	1.7	7	μs
$t_{d(OFF)L}$	Current Turn-Off Delay Time-Inductive	V_{CE} = 300V, L = 500μHy, V_{GE} = 5V, R_G = 1KΩ, T_J = 25°C, See Fig.12	-	5.4	15	μs
t_{fL}	Current Fall Time-Inductive		-	1.64	15	μs
SCIS	Self Clamped inductive Switching	T_J = 25°C, L = 3.0mHy, I_{CE} = 14.7A, R_G = 1KΩ, V_{GE} = 5V, See Fig.1&2	-	-	320	mJ

Thermal Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance Junction to Case	All Packages	-	-	0.8	°C/W

Typical Performance Curves

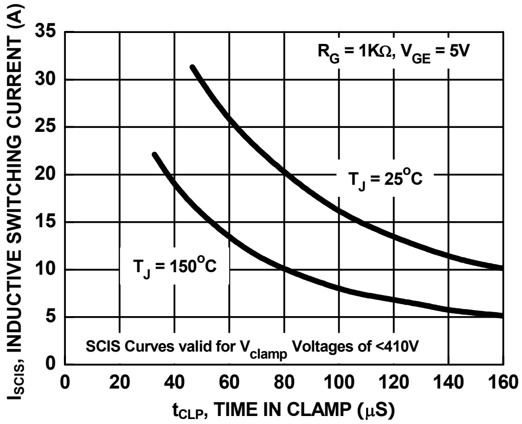


Figure 1. Self Clamped Inductive Switching Current vs. Time in Clamp

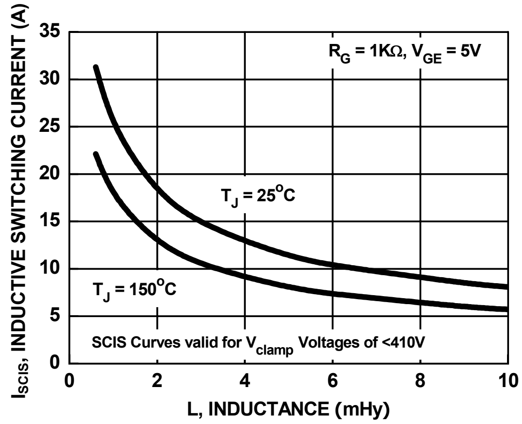


Figure 2. Self Clamped Inductive Switching Current vs. Inductance

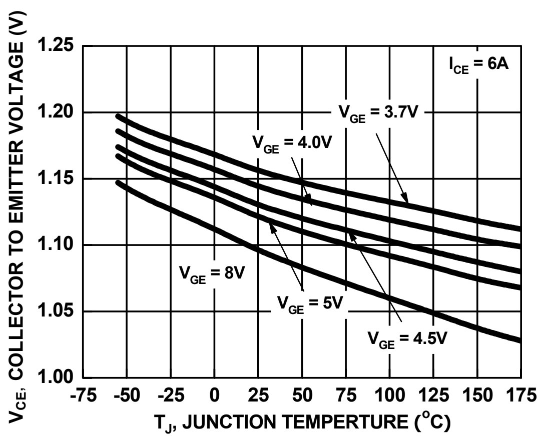


Figure 3. Collector to Emitter On-State Voltage vs. Junction Temperature

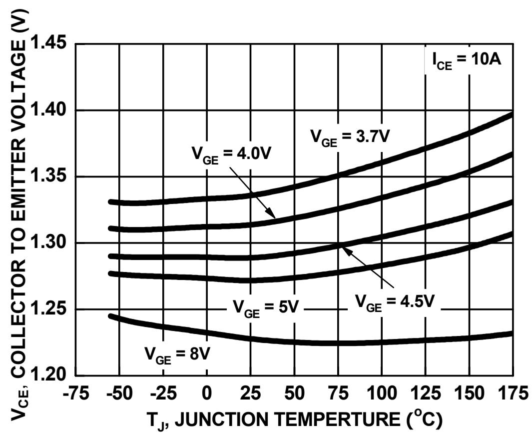


Figure 4. Collector to Emitter On-State Voltage vs. Junction Temperature

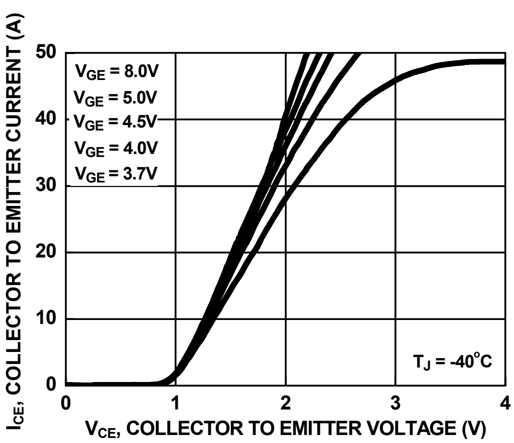


Figure 5. Collector to Emitter On-State Voltage vs. Collector Current

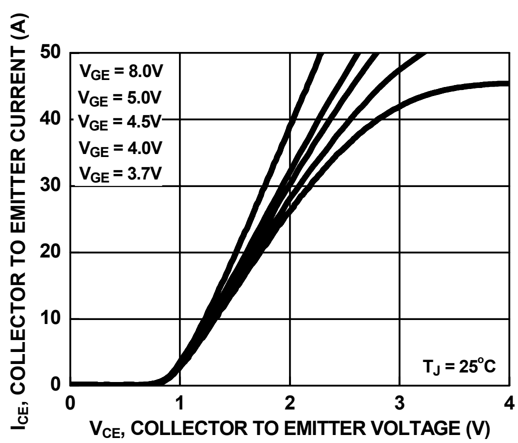


Figure 6. Collector to Emitter On-State Voltage vs. Collector Current

Typical Performance Curves (Continued)

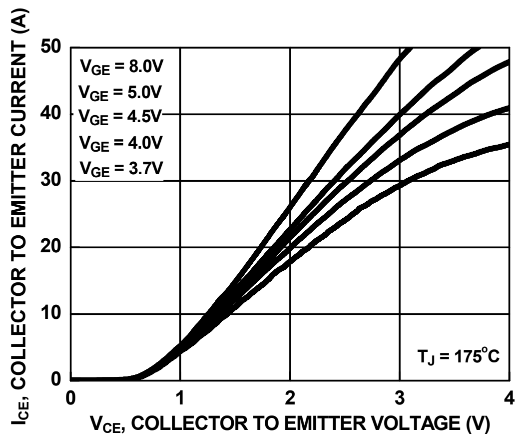


Figure 7. Collector to Emitter On-State Voltage vs. Collector Current

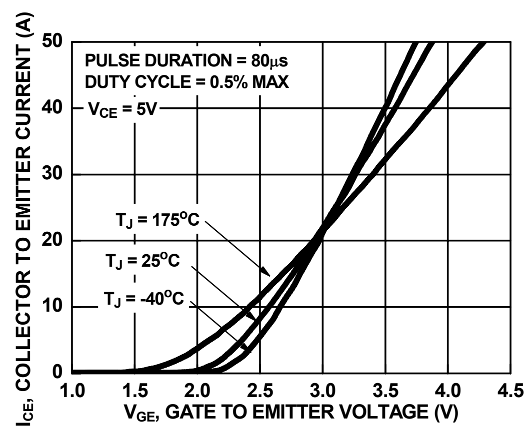


Figure 8. Transfer Characteristics

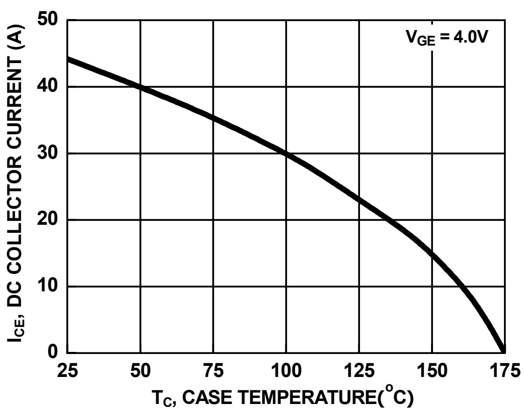


Figure 9. DC Collector Current vs. Case Temperature

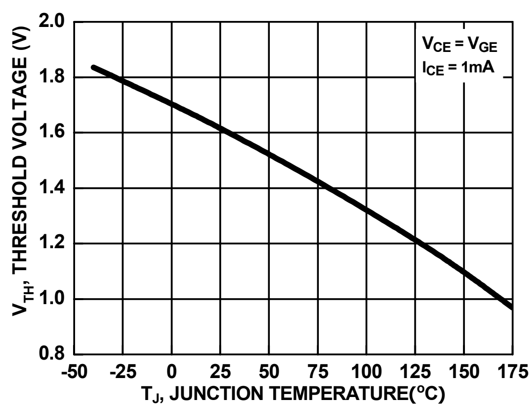


Figure 10. Threshold Voltage vs. Junction Temperature

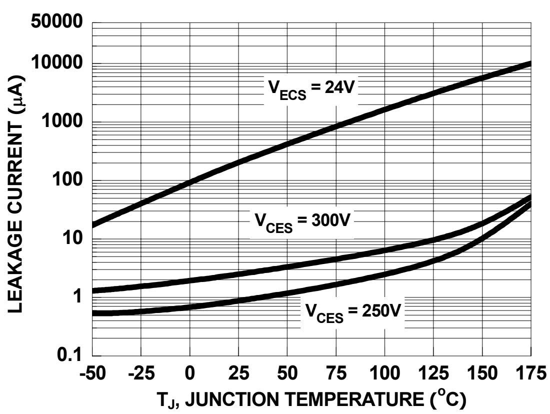


Figure 11. Leakage Current vs. Junction Temperature

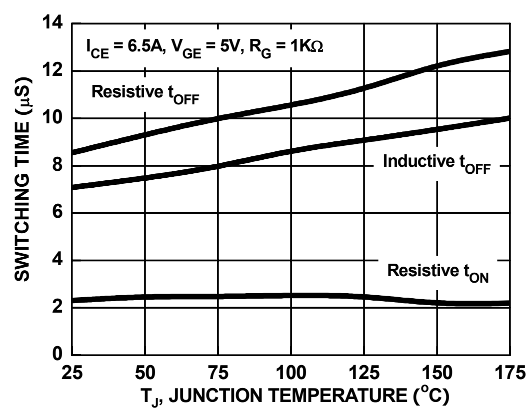


Figure 12. Switching Time vs. Junction Temperature

Typical Performance Curves (Continued)

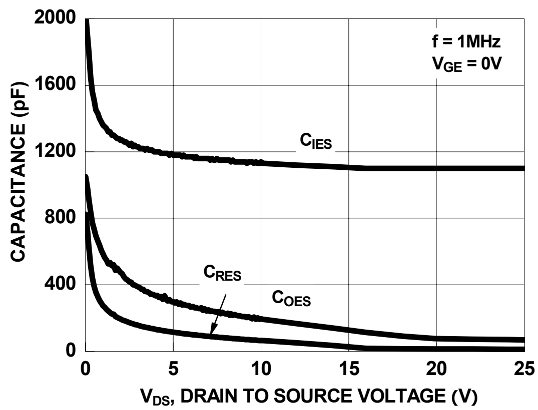


Figure 13. Capacitance vs. Collector to Emitter Voltage

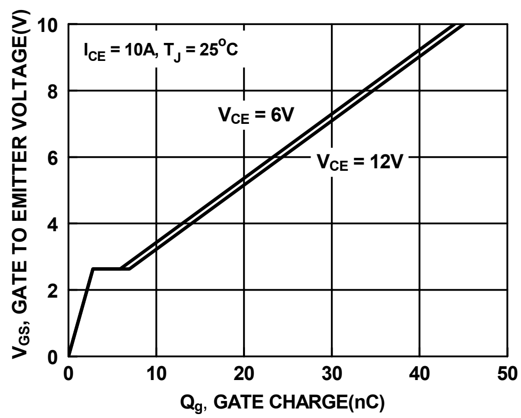


Figure 14. Gate Charge

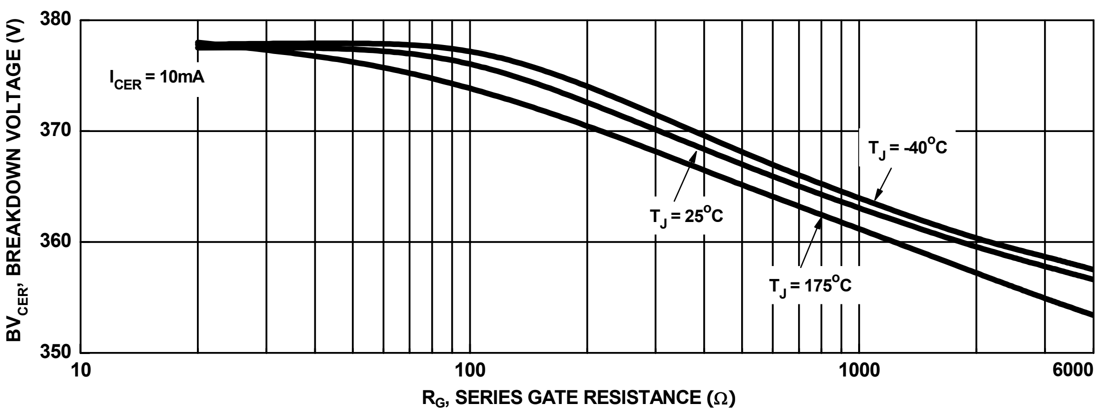


Figure 15. Break Down Voltage vs. Series Gate Resistance

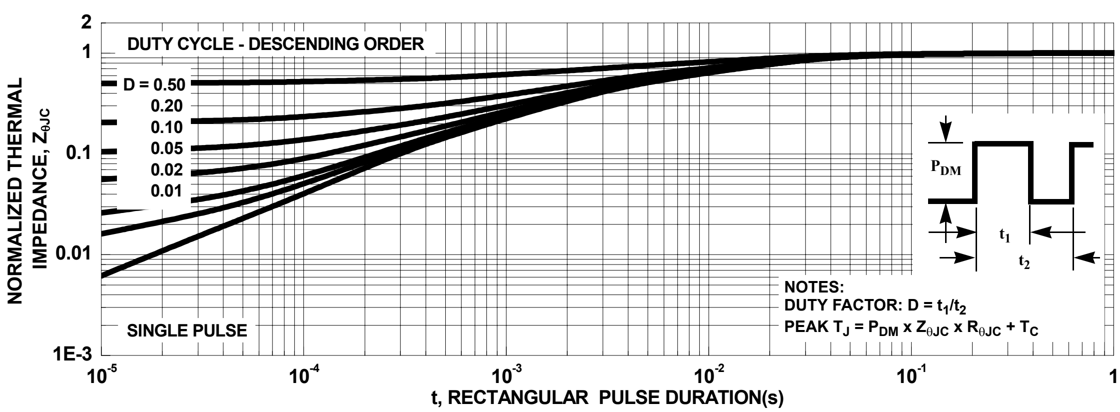


Figure 16. IGBT Normalized Transient Thermal Impedance, Junction to Case

Test Circuit and Waveforms

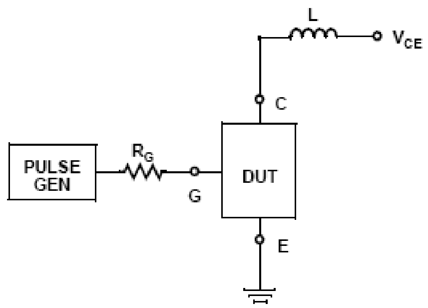


Figure 17. Inductive Switching Test Circuit

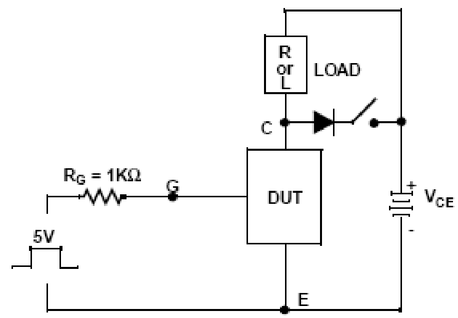


Figure 18. t_{ON} and t_{OFF} Switching Test Circuit

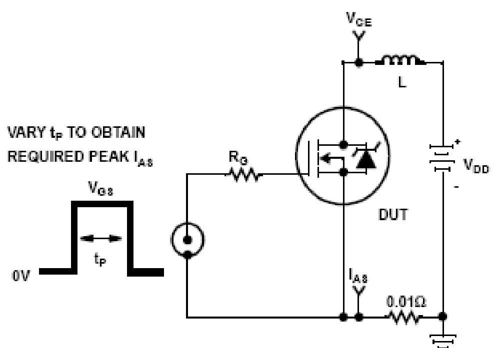


Figure 19. Energy Test Circuit

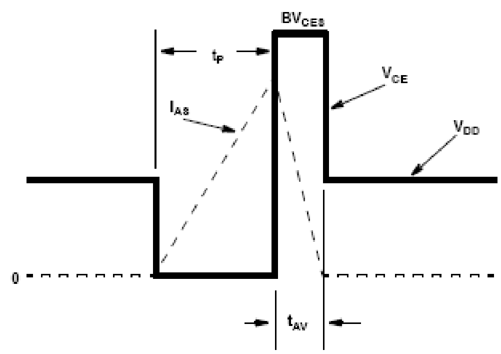
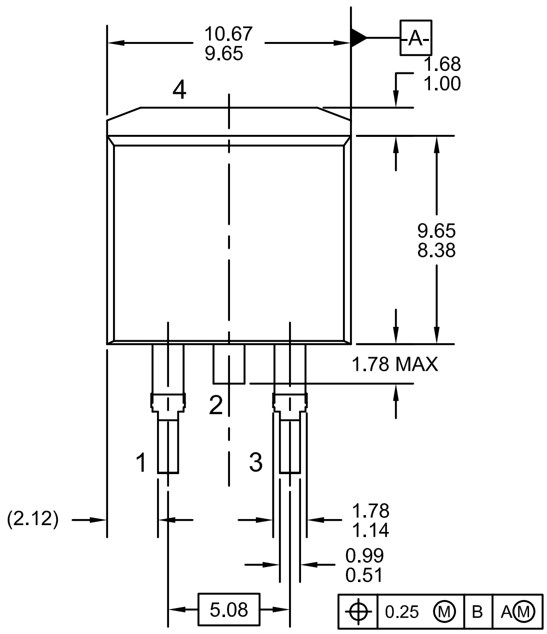
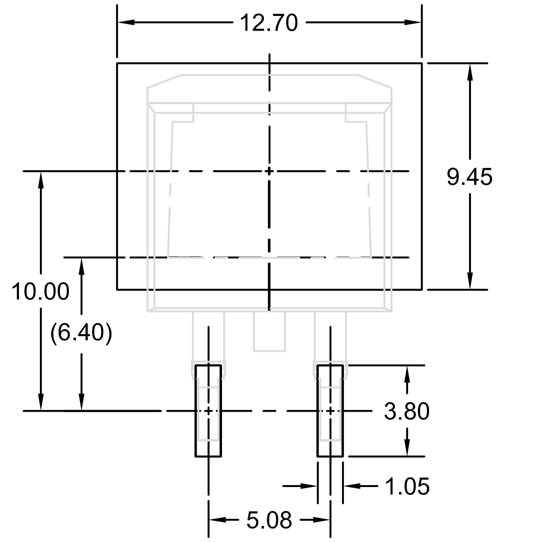


Figure 20. Energy Waveforms

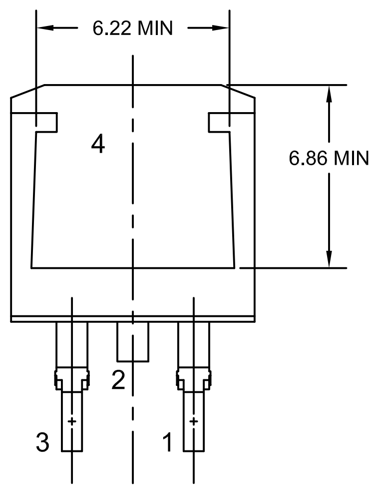
REVISIONS

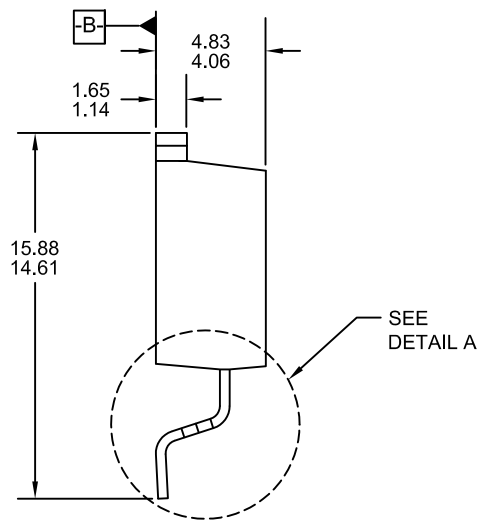
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
A	RELEASE TO DOCUMENT CONTROL	CB/085/99	08NOV1999	MRG
B	CHG HEATSINK DIM FR 1.32/1.02 TO 1.60/1.00, PKG DIM FR 8.84/8.53 TO 9.65/8.51, LD CUT FR 1.56/1.20 TO 1.77/1.20, ADD DIM (2.12); CHG TER 4 FR 8.37/7.77 TO (8.00), FR 6.75/6.15 TO (7.20); TOT LGH FR 15.39/15.09 TO 15.88/14.61; ADD DETAIL A; CHG LD THICK FR 0.56/0.36 TO 0.60/0.33; CHG FOOT LGTH FR 2.79/2.29 TO 2.84/2.24; ADD DIM (5.38); CHG LAND PATTERN DIM FR 9.50 TO 9.50 MIN, FR 9.00 TO 9.00 MIN, FR 4.00 TO 4.00 MIN, FR 1.50 TO 1.50 MIN; DEL NOTE C&D AND ARRANGE. ADD NOTE D.	CB/044/00	28FEB2000	MRG
C	CHG CEN LD CUT FR 1.77/1.20 TO 1.78 MAX; LD WID FR 1.02/0.38 TO 0.99/0.51; PKG THICK FR 4.83/3.56 TO 4.83/4.06; HEAT SINK THICK FR 1.40/1.14 TO 1.65/1.14; LD THICK FR 0.60/0.33 TO 0.74/0.33; FOOT LANDING FR 2.84/2.24 TO 2.79/1.78; FOOT ANGLE FR 3/0 TO 8/0 DEG; PROFILE DIM FR 0.13 MAX TO 0.25 MAX; BACK HEAT SINK WID FR (8.00) TO 6.22 MIN, LEN FR (7.20) TO 6.86 MIN; REMOVE EJECTOR PIN MARK; ADD NOTE E	CB/254/04	7OCT2004	RCM
D	REMOVE NOTE B; ADD NOTE E	CB/043/05	30MAR2005	MRG
5	REMOVED SITE INFO AND ECN COLUMN, ADDED NOTE F, TITLE CHANGED		06AUG2007	H.ALLEN
6	UPDATED HEATSINK PER IPC STANDARD, NOTE E IPC REFERENCE, FONT TO ARIAL, UPDATED DRAWING TITLE TO REFLECT JEDEC STANDARD.		02 MAY 09	H.ALLEN





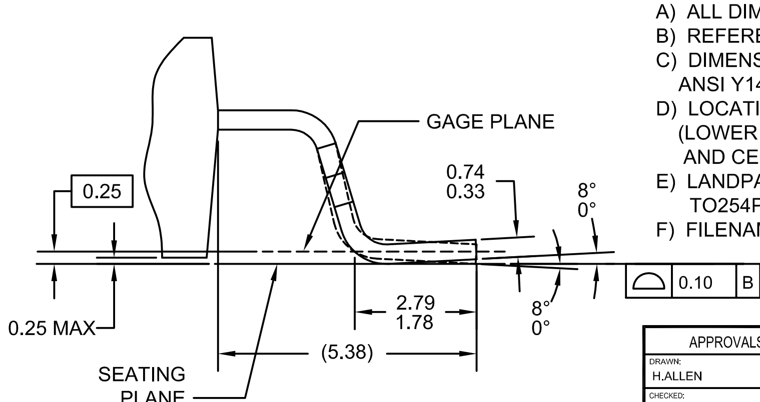
LAND PATTERN RECOMMENDATION
UNLESS NOTED, ALL DIMS TYPICAL





NOTES: UNLESS OTHERWISE SPECIFIED

A) ALL DIMENSIONS ARE IN MILLIMETERS.
B) REFERENCE JEDEC, TO-263, VARIATION AB.
C) DIMENSIONING AND TOLERANCING PER ANSI Y14.5M - 1994.
D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE).
E) LANDPATTERN RECOMMENDATION PER IPC TO254P1524X482-3N
F) FILENAME: TO263A02REV6



DETAIL A, ROTATED 90°
SCALE: 2X

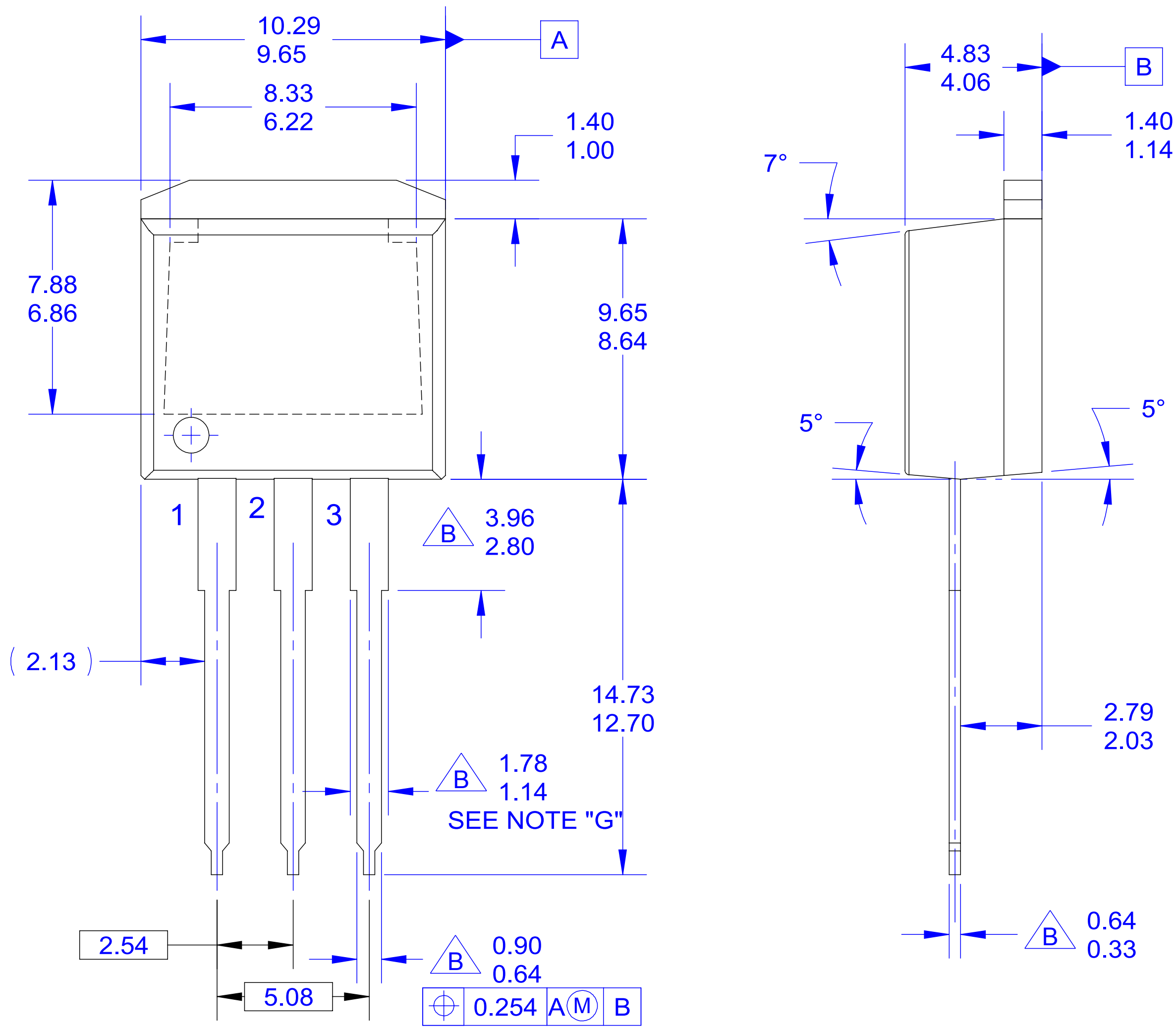
APPROVALS	DATE
DRAWN: H.ALLEN	2 MAY 09
CHECKED: WB LEE	2 MAY 09
APPROVED:	

FAIRCHILD SEMICONDUCTOR™

2LD, JEDEC TO-263,VARIATION AB,SURFACE MOUNT

PROJECTION	SCALE	SIZE	DRAWING NUMBER	REV
INCH [MM]	1:1	NA	MKT-TO263A02	6

FORMERLY: N/A   SHEET : 1 OF 1



NOTES:

A. EXCEPT WHERE NOTED CONFORMS TO TO262 JEDEC VARIATION AA.
B. DOES NOT COMPLY JEDEC STD. VALUE.
C. ALL DIMENSIONS ARE IN MILLIMETERS.
D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
E. DIMENSION AND TOLERANCE AS PER ANSI Y14.5-1994.
F. LOCATION OF PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF PACKAGE)
G. MAXIMUM WIDTH FOR F102 DEVICE = 1.35 MAX.
H. DRAWING FILE NAME: TO262A03REV5

APPROVALS	DATE
DRAWN: BOBOY MALDO	11FEB2010
CHECKED: KH LEE	
APPROVED: BY HUANG	
APPROVED: HOWARD ALLEN	
PROJECTION [MM] INCH	

FAIRCHILD SEMICONDUCTOR™

TO262 3LD JEDEC VARIATION AA

SCALE	SIZE	DRAWING NUMBER	REV
1:1	N/A	MKT-TO262A03	5

FORMERLY: N/A SHEET : 1 OF 1

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MotionMax™
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SuperSOT™-6
SuperSOT™-8
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VCX™
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VoltagePlus™
XS™

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As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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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