FAIRCHILD SEMICONDUCTOR®

HGTP20N35G3VL, HGT1S20N35G3VL, HGT1S20N35G3VLS

20A, 350V N-Channel, Logic Level, Voltage Clamping IGBTs

November 2003

Features

- **Logic Level Gate Drive**
- **Internal Voltage Clamp**
- **ESD Gate Protection**
- **T_J = 175°C**
- **Ignition Energy Capable**

Description

This N-Channel IGBT is a MOS gated, logic level device which is intended to be used as an ignition coil driver in automotive ignition circuits. Unique features include an active voltage clamp between the collector and the gate which provides Self Clamped Inductive Switching (SCIS) capability in ignition circuits. Internal diodes provide ESD protection for the logic level gate. Both a series resistor and a shunt resistor are provided in the gate circuit.

PACKAGING AVAILABILITY

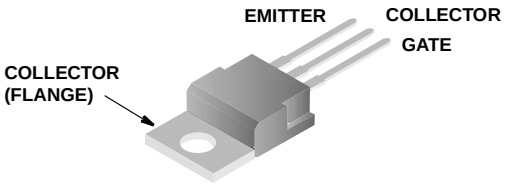
PART NUMBER	PACKAGE	BRAND
HGTP20N35G3VL	T0-220AB	20N35GVL
HGT1S20N35G3VL	T0-262AA	20N35GVL
HGT1S20N35G3VLS	T0-263AB	20N35GVL

NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-263AB variant in the tape and reel, i.e., HGT1S20N35G3VLS9A.

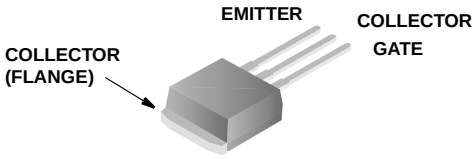
The development type number for this device is TA49076.

Packages

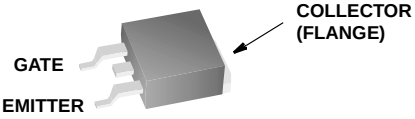
JEDEC TO-220AB



JEDEC TO-262AA

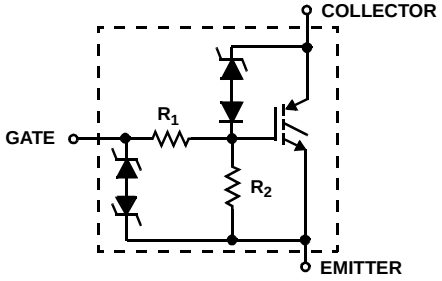


JEDEC TO-263AB



Terminal Diagram

N-CHANNEL ENHANCEMENT MODE



Absolute Maximum Ratings T_C = +25°C, Unless Otherwise Specified

	HGTP20N35G3VL, HGT1S20N35G3VL, HGT1S20N35G3VLS	UNITS
Collector-Emitter Bkdn Voltage At 10mA, R_{GE} = 1kΩ. . . . . BV_{CER}	375	V
Emitter-Collector Bkdn Voltage At 10mA . . . . . BV_{ECS}	24	V
Collector Current Continuous At V_{GE} = 5.0V, T_C = +25°C, Figure 7 . . . . . I_{C25}	20	A
At V_{GE} = 5.0V, T_C = +100°C . . . . . I_{C100}	20	A
Gate-Emitter-Voltage (Note) . . . . . V_{GES}	±10	V
Inductive Switching Current At L = 2.3mH, T_C = +25° C . . . . . I_{SCIS}	21	A
At L = 2.3mH, T_C = +150°C . . . . . I_{SCIS}	16	A
Collector to Emitter Avalanche Energy At L = 2.3mH, T_C = +25°C . . . . . E_{AS}	500	mJ
Power Dissipation Total At T_C = +25°C. . . . . P_D	150	W
Power Dissipation Derating T_C > +25°C.	1.0	W/°C
Operating and Storage Junction Temperature Range . . . . . T_J, T_{STG}	-40 to +175	°C
Maximum Lead Temperature for Soldering . . . . . T_L	260	°C
Electrostatic Voltage at 100pF, 1500Ω. . . . . ESD	6	KV

NOTE: May be exceeded if I_{GEM} is limited to 10mA.

©2003 Fairchild Semiconductor Corporation

Electrical Specifications $T_C = +25^oC$, Unless Otherwise Specified

PARAMETERS	SYMBOL	TEST CONDITIONS		LIMITS MIN	LIMITS TYP	LIMITS MAX	UNITS
Collector-Emitter Breakdown Voltage	BV_{CES}	I_C = 10mA, V_{GE} = 0V	$T_C = +175^oC$	310	345	380	V
			$T_C = +25^oC$	320	350	380	V
			$T_C = -40^oC$	320	355	390	V
Collector-Emitter Breakdown Voltage	BV_{CER}	I_C = 10mA, V_{GE} = 0V, R_{GE} = 1kΩ	$T_C = +175^oC$	300	340	375	V
			$T_C = +25^oC$	315	345	375	V
			$T_C = -40^oC$	315	350	390	V
Gate-Emitter Plateau Voltage	V_{GEP}	I_C = 10A, V_{CE} = 12V	$T_C = +25^oC$	-	3.7	-	V
Gate Charge	$Q_{G(ON)}$	I_C = 10A, V_{GE} = 5V, V_{CE} = 12V	$T_C = +25^oC$	-	28.7	-	nC
Collector-Emitter Clamp Bkdn. Voltage	$BV_{CE(CL)}$	I_C = 10A, R_G = 0Ω	$T_C = +175^oC$	325	360	395	V
Emitter-Collector Breakdown Voltage	BV_{ECS}	I_C = 10mA	$T_C = +25^oC$	20	32	-	V
Collector-Emitter Leakage Current	I_{CES}	V_{CE} = 250V	$T_C = +25^oC$	-	-	5	μA
		V_{CE} = 250V	$T_C = +175^oC$	-	-	250	μA
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	I_C = 10A, V_{GE} = 4.5V	$T_C = +25^oC$	-	1.3	1.6	V
			$T_C = +175^oC$	-	1.25	1.5	V
		I_C = 20A, V_{GE} = 5.0V	$T_C = +25^oC$	-	1.6	2.8	V
			$T_C = +175^oC$	-	1.9	3.5	V
Gate-Emitter Threshold Voltage	$V_{GE(TH)}$	I_C = 1mA, $V_{CE} = V_{GE}$	$T_C = +25^oC$	1.3	1.8	2.3	V
Gate Series Resistance	R_1		$T_C = +25^oC$	-	1.0	-	kΩ
Gate-Emitter Resistance	R_2		$T_C = +25^oC$	10	17	25	kΩ
Gate-Emitter Leakage Current	I_{GES}	V_{GE} = ±10V		±400	±590	±1000	μA
Gate-Emitter Breakdown Voltage	BV_{GES}	I_{GES} = ±2mA		±12	±14	-	V
Current Turn-Off Time-Inductive Load	$t_{D(OFF)I} + t_{F(OFF)I}$	I_C = 10A, R_G = 25Ω, L = 550μH, R_L = 26.4Ω, V_{GE} = 5V, V_{CL} = 300V, $T_C = +175^oC$		-	15	30	μs
Inductive Use Test	I_{SCIS}	L = 2.3mH, V_G = 5V, R_G = 0Ω	$T_C = +150^oC$	16	-	-	A
			$T_C = +25^oC$	21	-	-	A
Thermal Resistance	$R_{\theta JC}$			-	-	1.0	$^oC/W$

©2003 Fairchild Semiconductor Corporation

Typical Performance Curves

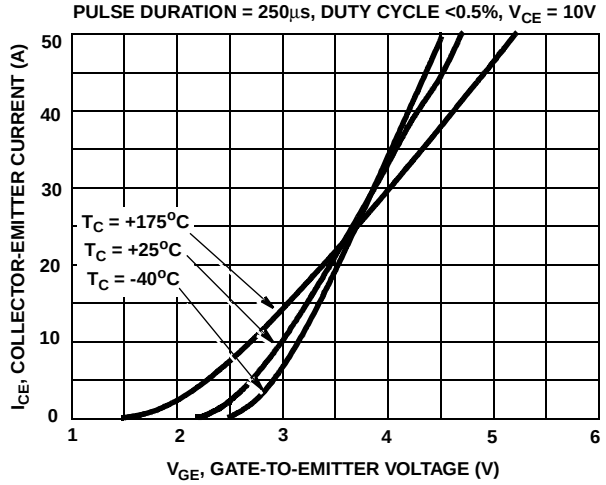


FIGURE 1. TRANSFER CHARACTERISTICS

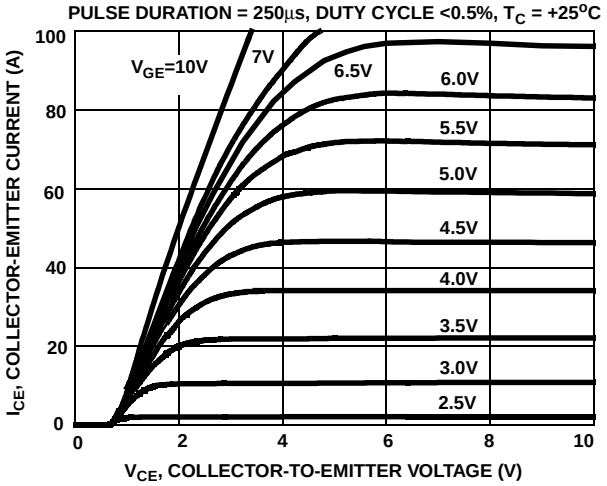


FIGURE 2. SATURATION CHARACTERISTICS

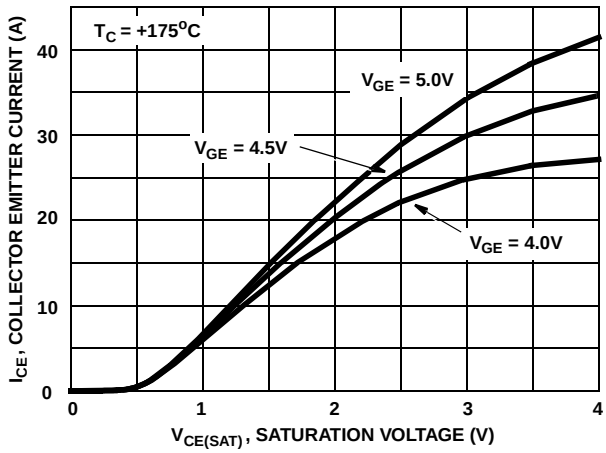


FIGURE 3. COLLECTOR-EMITTER CURRENT AS A FUNCTION OF SATURATION VOLTAGE

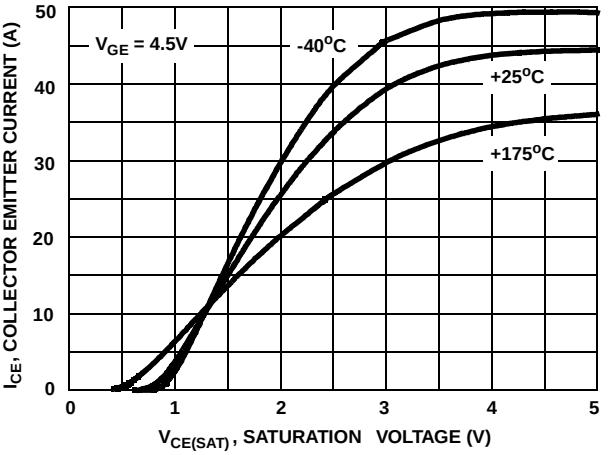


FIGURE 4. COLLECTOR-EMITTER CURRENT AS A FUNCTION OF SATURATION VOLTAGE

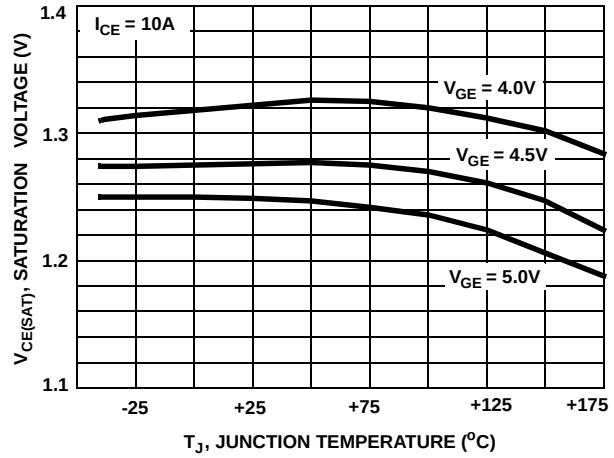


FIGURE 5. SATURATION VOLTAGE AS A FUNCTION OF JUNCTION TEMPERATURE

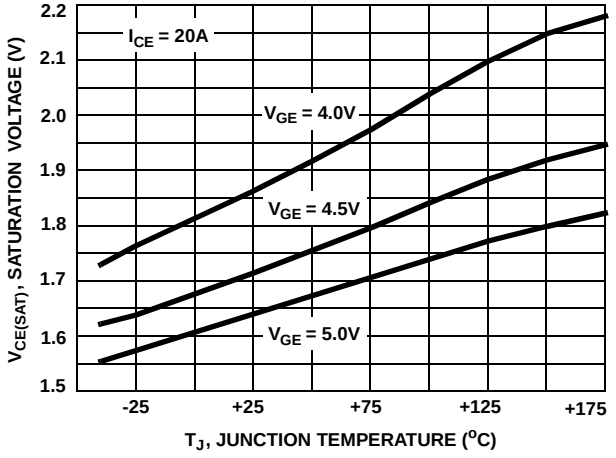


FIGURE 6. SATURATION VOLTAGE AS A FUNCTION OF JUNCTION TEMPERATURE

©2003 Fairchild Semiconductor Corporation

Typical Performance Curves (Continued)

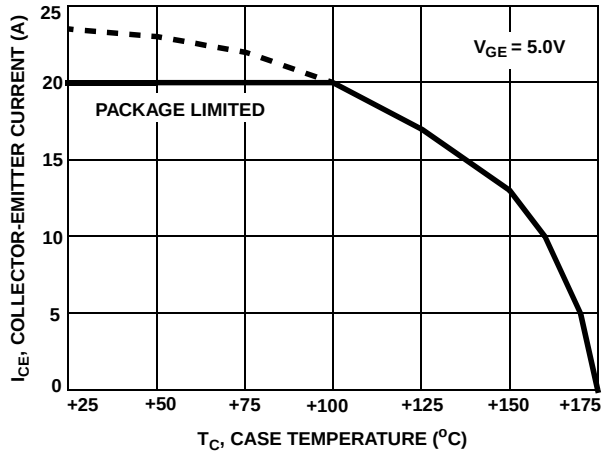


FIGURE 7. COLLECTOR-EMITTER CURRENT AS A FUNCTION OF CASE TEMPERATURE

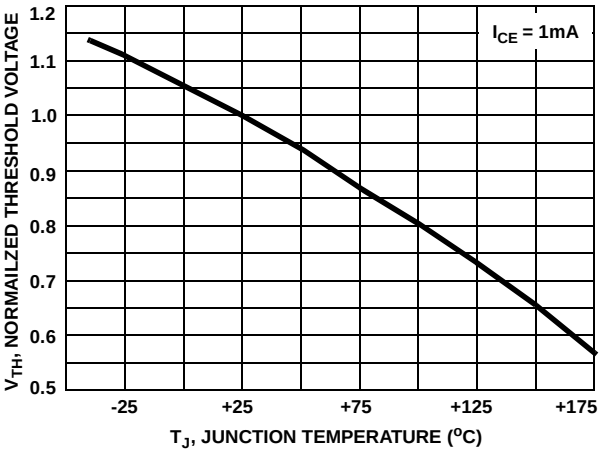


FIGURE 8. NORMALIZED THRESHOLD VOLTAGE AS A FUNCTION OF JUNCTION TEMPERATURE

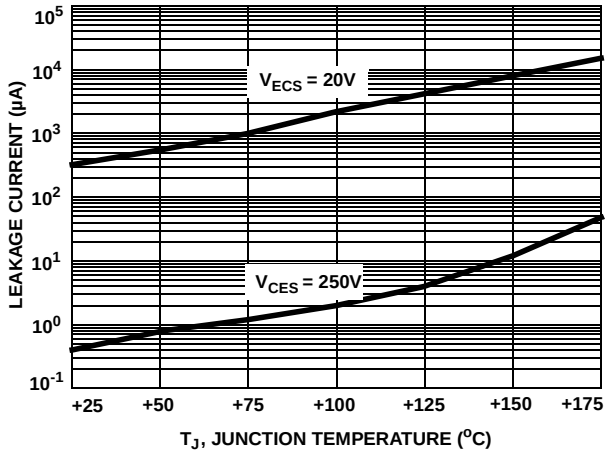


FIGURE 9. LEAKAGE CURRENT AS A FUNCTION OF JUNCTION TEMPERATURE

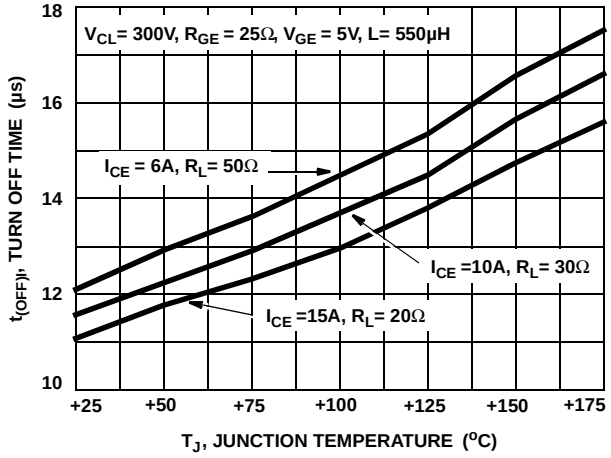


FIGURE 10. TURN-OFF TIME AS A FUNCTION OF JUNCTION TEMPERATURE

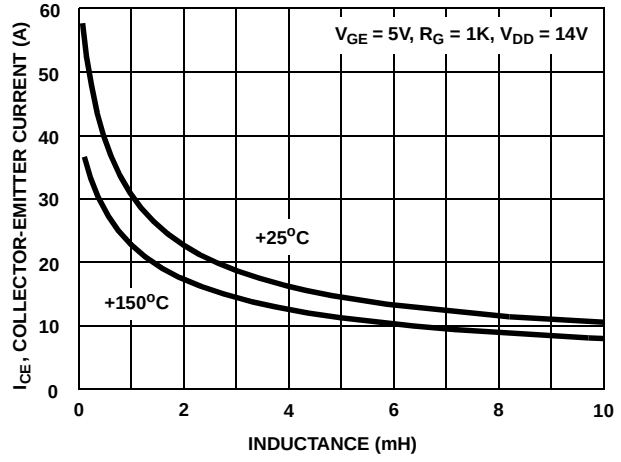


FIGURE 11. SELF CLAMPED INDUCTIVE SWITCHING CURRENT vs INDUCTANCE

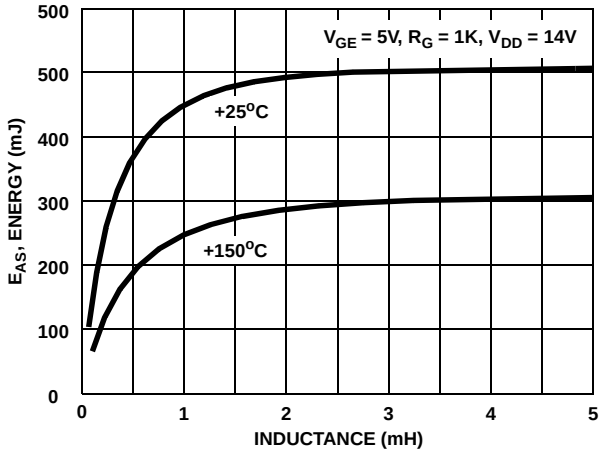


FIGURE 12. SELF CLAMPED INDUCTIVE SWITCHING ENERGY vs INDUCTANCE

©2003 Fairchild Semiconductor Corporation

Typical Performance Curves (Continued)

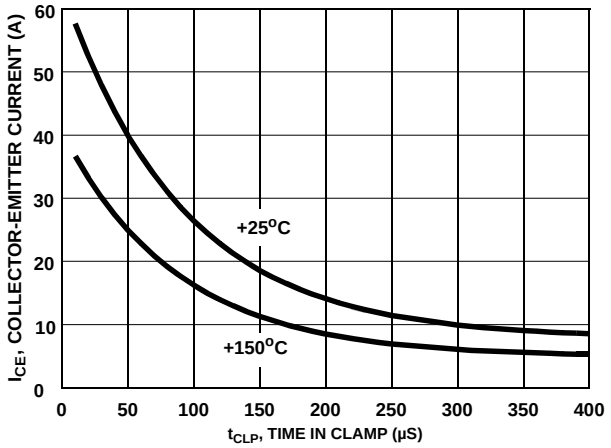


FIGURE 13. SELF CLAMPED INDUCTIVE SWITCHING CURRENT vs TIME IN CLAMP

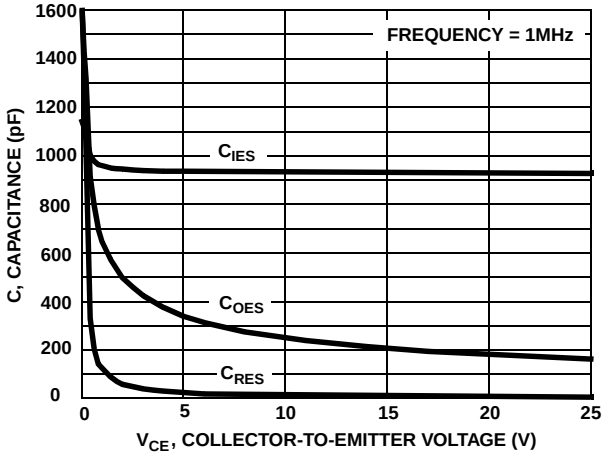


FIGURE 14. CAPACITANCE AS A FUNCTION OF COLLECTOR-EMITTER VOLTAGE

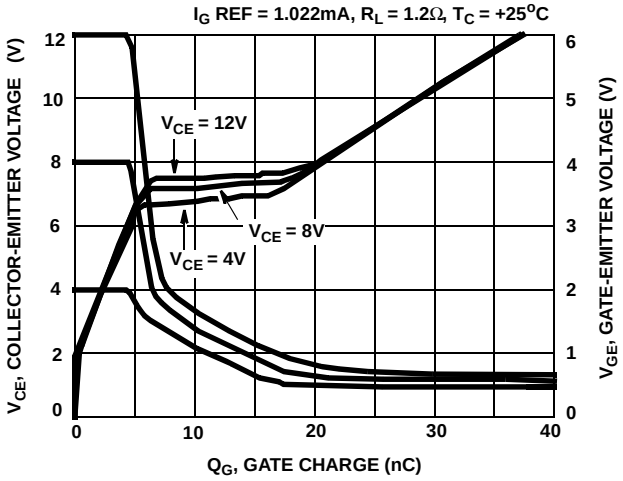


FIGURE 15. GATE CHARGE

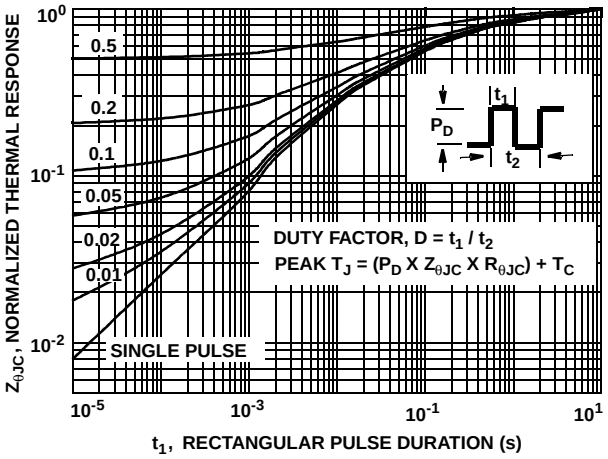


FIGURE 16. NORMALIZED TRANSIENT THERMAL IMPEDANCE, JUNCTION TO CASE

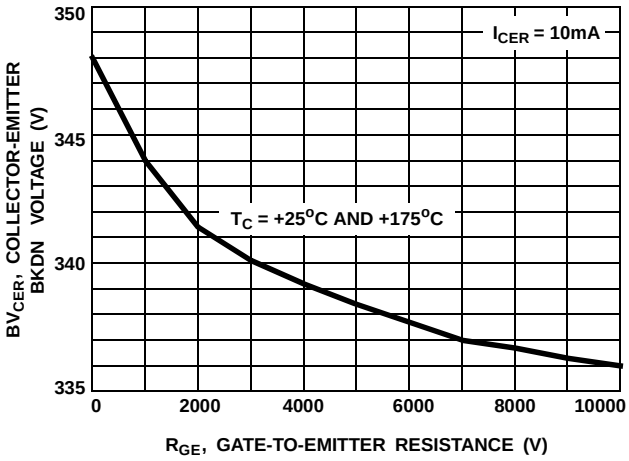


FIGURE 17. BREAKDOWN VOLTAGE AS A FUNCTION OF GATE - EMITTER RESISTANCE

©2003 Fairchild Semiconductor Corporation

Test Circuits

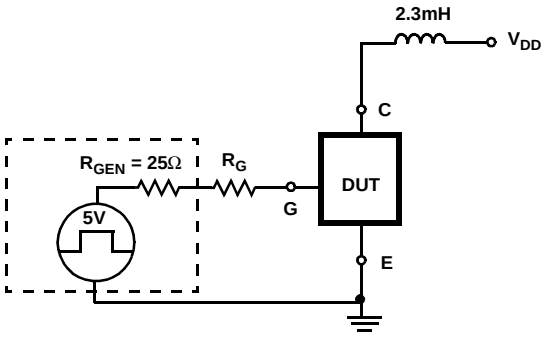


FIGURE 18. USE TEST CIRCUIT

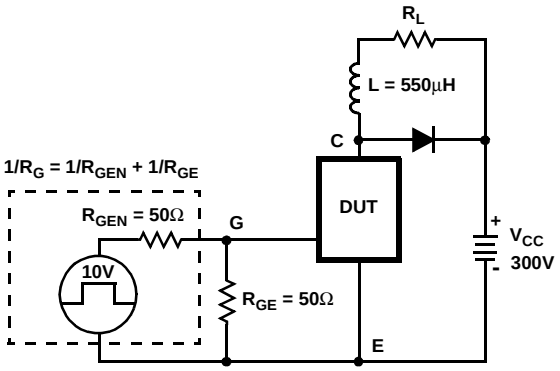


FIGURE 19. INDUCTIVE SWITCHING TEST CIRCUIT

©2003 Fairchild Semiconductor Corporation

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™	FACT Quiet Series™	LittleFET™	Power247™	SuperSOT™-6
ActiveArray™	FAST®	MICROCOUPLER™	PowerTrench®	SuperSOT™-8
Bottomless™	FASTr™	MicroFET™	QFET®	SyncFET™
CoolFET™	FRFET™	MicroPak™	QS™	TinyLogic®
CROSSVOLT™	GlobalOptoisolator™	MICROWIRE™	QT Optoelectronics™	TINYOPTO™
DOME™	GTO™	MSX™	Quiet Series™	TruTranslation™
EcoSPARK™	HiSeC™	MSXPro™	RapidConfigure™	UHC™
E^2CMOS^{TM}	I^2C™	OCX™	RapidConnect™	UltraFET®
EnSigna™	ImpliedDisconnect™	OCXPro™	SILENT SWITCHER®	VCX™
FACT™	ISOPLANAR™	OPTOLOGIC®	SMART START™	
Across the board. Around the world.™		OPTOPLANAR™	SPM™	
The Power Franchise™		PACMAN™	Stealth™	
Programmable Active Droop™		POP™	SuperSOT™-3	

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

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, or (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 significant injury to the user.

2. A critical component is 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.

PRODUCT STATUS DEFINITIONS

Definition of Terms

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

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.