STX13005

HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- HIGH VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED

APPLICATION

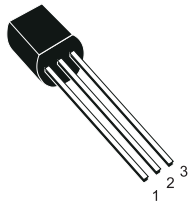
- COMPACT FLUORESCENT LAMPS (CFLS)
- SWITCH MODE POWER SUPPLIES (AC / DC CONVERTERS)

DESCRIPTION

The device is manufactured using high voltage Multi-Epitaxial Planar technology for high switching speeds and high voltage capability.

It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA.

Figure 1: Package



TO-92

Figure 2: Internal Schematic Diagram

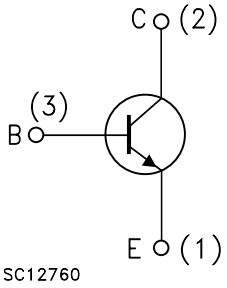


Table 1: Order Code

Part Number	Marking	Package	Packaging
STX13005	X13005	TO-92	Bulk
STX13005-AP	X13005	TO-92 AP	Ammopack

Table 2: Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{BE} = 0)	700	V
V_{CEO}	Collector-Emitter Voltage (I_B= 0)	400	V
V_{EBO}	Emitter-Base Voltage (I_C= 0, I_B = 1.5 A, t_p < 10ms)	$V_{(BR)EBO}$	V
I_C	Collector Current	3	A
I_{CM}	Collector Peak Current (t_p < 5ms)	6	A
I_B	Base Current	1.5	A
I_{BM}	Base Peak Current (t_p < 5ms)	3	A
P_{tot}	Total Dissipation at T_C = 25 °C	2.8	W

Symbol	Parameter	Value	Unit
T_{stg}	Storage Temperature	-65 to 150	°C
T_J	Max. Operating Junction Temperature	150	°C

Table 3: Thermal Data

Symbol	Parameter			Unit
$R_{thj\text{-}case}$	Thermal Resistance Junction-Case	Max	44.6	$^oC/W$
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	150	$^oC/W$

Table 4: Electrical Characteristics (T_{case} = 25 ^{o}C unless otherwise specified)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I_{CES}	Collector Cut-off Current (V_{BE} = 0)	V_{CE} = 700 V				1	mA
		V_{CE} = 700 V	T_j = 125 ^{o}C			5	mA
I_{CEO}	Collector Cut-off Current (I_B = 0)	V_{CE} = 400 V				1	mA
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage (I_C = 0)	I_E = 10 mA	L = 25 mH	9		18	V
$V_{CE(sus)}$*	Collector-Emitter Sustaining Voltage (I_B = 0)	I_C = 10 mA		400			V
$V_{CE(sat)}$*	Collector-Emitter Saturation Voltage	I_C = 1 A	I_B = 200 mA			0.5	V
		I_C = 2 A	I_B = 500 mA			0.6	V
		I_C = 3 A	I_B = 750 mA			5	V
$V_{BE(sat)}$*	Base-Emitter Saturation Voltage	I_C = 1 A	I_B = 200 mA			1.2	V
		I_C = 2 A	I_B = 500 mA			1.6	V
h_{FE}*	DC Current Gain	I_C = 1 A	V_{CE} = 5 V	10		30	
		I_C = 2 A	V_{CE} = 5 V	8		24	
	RESISTIVE LOAD	I_C = 2 A	V_{CC} = 125 V				
t_s	Storage Time	I_{B1} = - I_{B2} = 400 mA	t_p = 30 µs		1.65		µs
t_f	Fall Time	(see figure 16)			260		ns
	INDUCTIVE LOAD	I_C = 1 A	V_{Clamp} = 300 V				
t_s	Storage Time	I_{B1} = 200 mA	$V_{BE(off)}$ = -5 V		0.8		µs
t_f	Fall Time	L = 50 mH	R_{BB} = 0		150		ns
		(see figure 15)					

* Pulsed: Pulsed duration = 300 μs, duty cycle $\leq$ 1.5 %.

Figure 3: Safe Operating Area

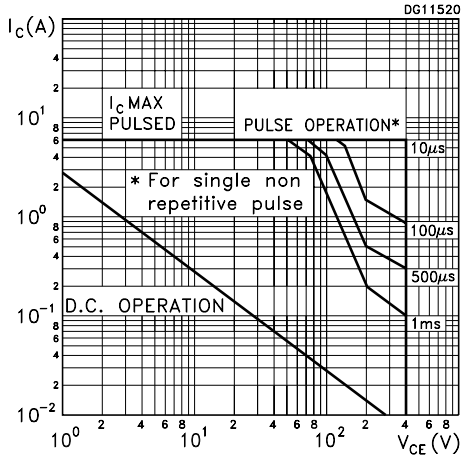


Figure 4: Output Chatacterisctics

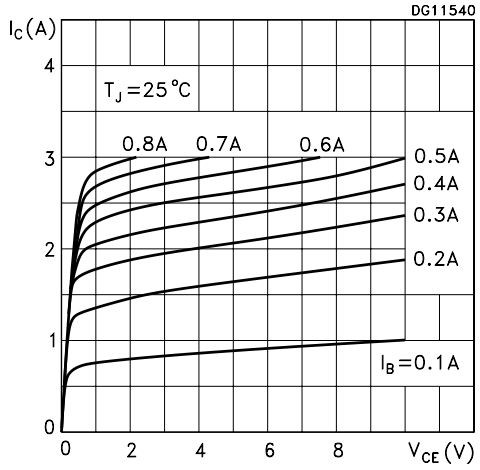


Figure 5: DC Current Gain

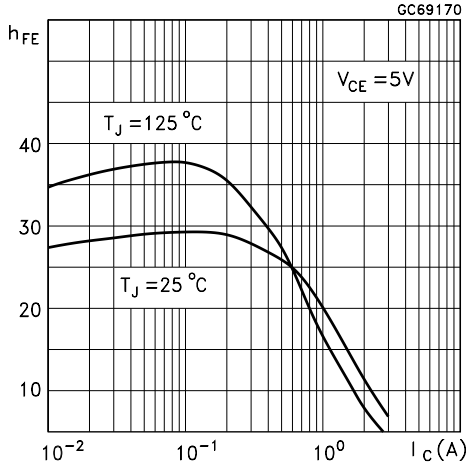


Figure 6: Derating Curve

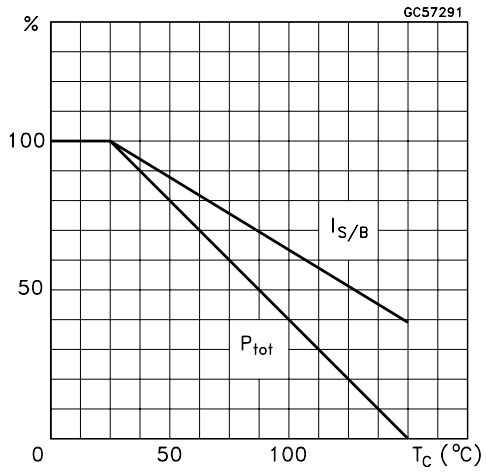


Figure 7: DC Current Gain

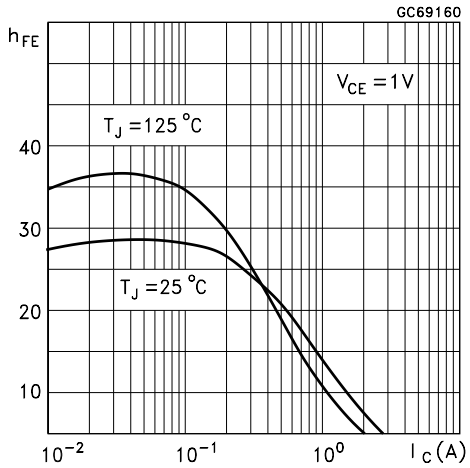


Figure 8: Collector-Emitter Saturation Voltage

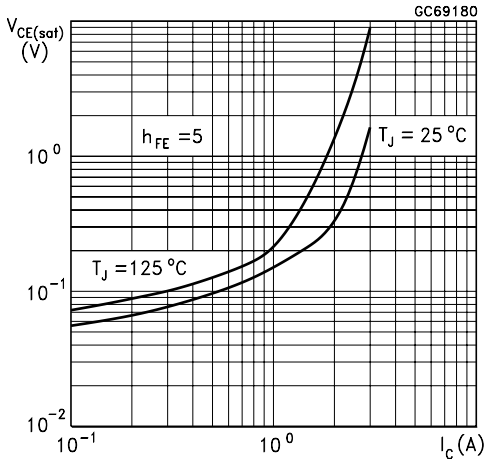


Figure 9: Base-Emitter Saturation Voltage

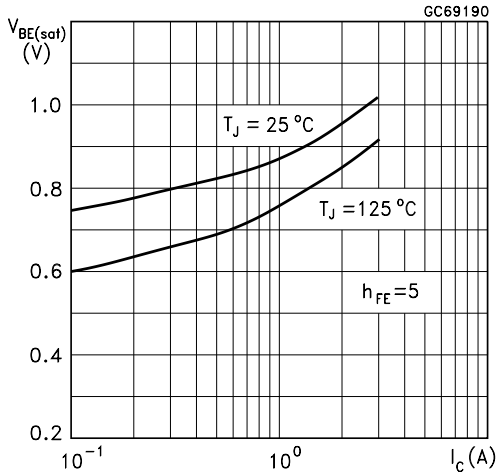


Figure 10: Resistive Load Fall Time

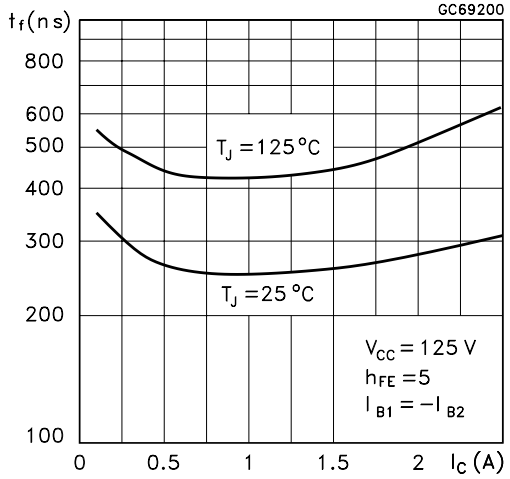


Figure 11: Inductive Load Fall Time

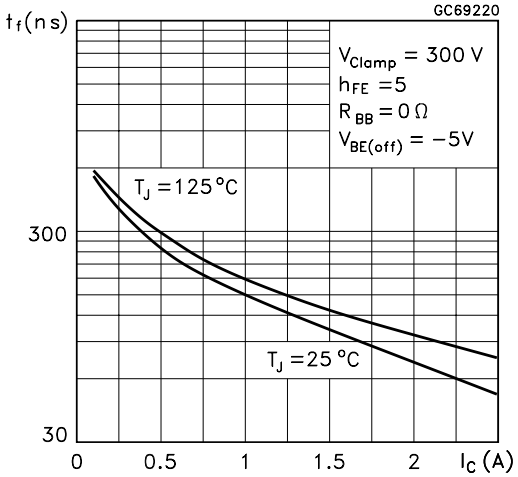


Figure 12: Resistive Load Storage Time

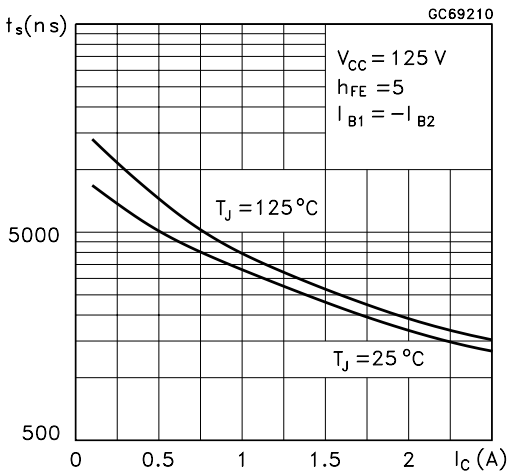


Figure 13: Inductive Load Storage Time

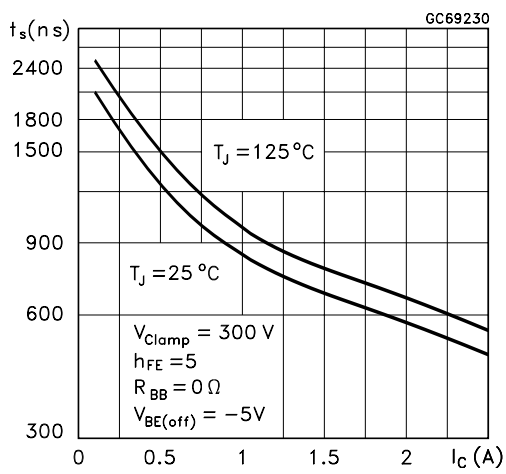


Figure 14: Reverse Biased Safe Operating Area

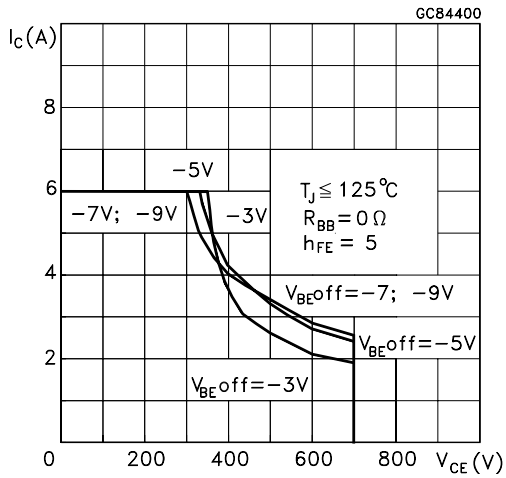


Figure 15: Inductive Load Switching Test Circuit

1) Fast electronic switch
2) Non-inductive Resistor
3) Fast recovery rectifier

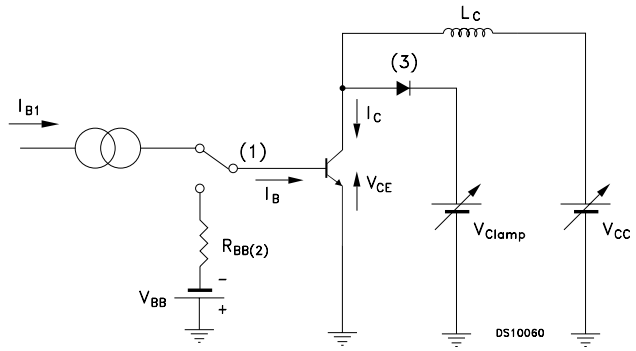
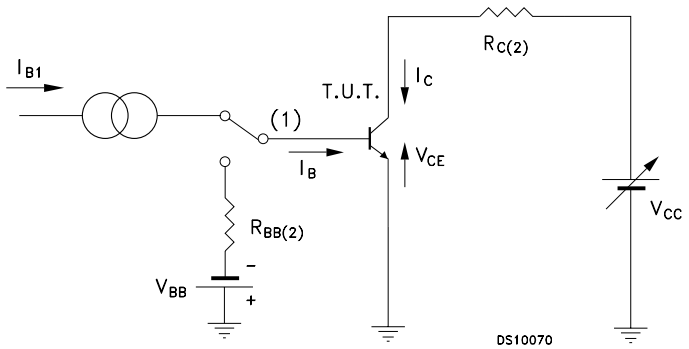


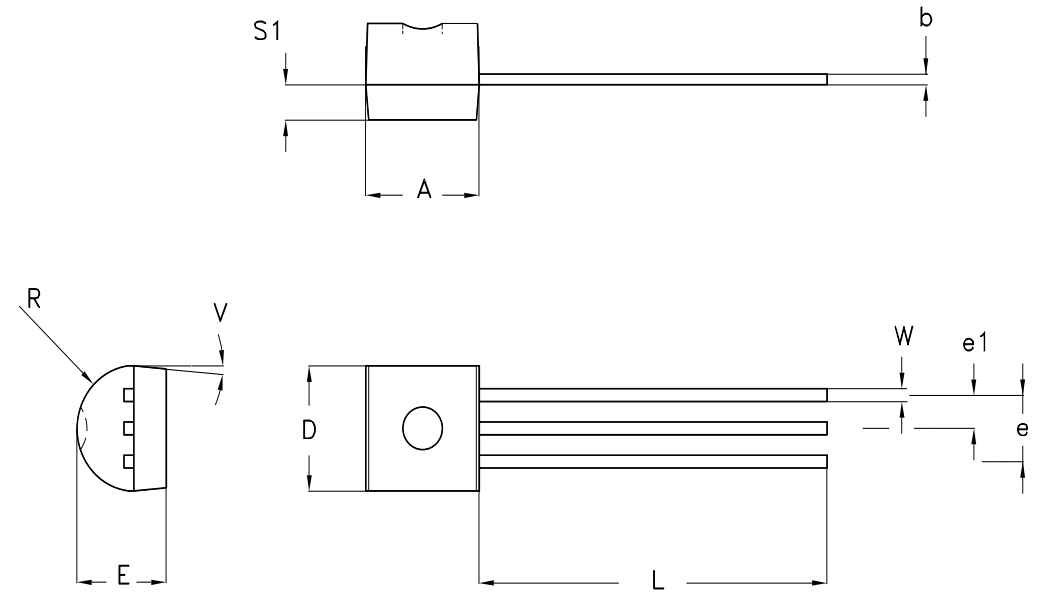
Table 16: Restistive Load Switching Test Circuit

1) Fast electronic switch
2) Non-inductive Resistor



TO-92 BULK SHIPMENT MECHANICAL DATA

DIM.	mm.		
	MIN.	TYP	MAX.
A	4.32		4.95
b	0.36		0.51
D	4.45		4.95
E	3.30		3.94
e	2.41		2.67
e1	1.14		1.40
L	12.70		15.49
R	2.16		2.41
S1	0.92		1.52
W	0.41		0.56
V		5^{O}	



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TO-92 AMMOPACK SHIPMENT (Suffix"-AP") MECHANICAL DATA

DIM.	mm.		
	MIN.	TYP	MAX.
A1			4.80
T			3.80
T1			1.60
T2			2.30
d			0.48
P0	12.50	12.70	12.90
P2	5.65	6.35	7.05
F1,F2	2.44	2.54	2.94
delta H	-2.00		2.00
W	17.50	18.00	19.00
W0	5.70	6.00	6.30
W1	8.50	9.00	9.25
W2			0.50
H	18.50		20.50
H0	15.50	16.00	16.50
H1			25.00
D0	3.80	4.00	4.20
t			0.90
L			11.00
I1	3.00		
delta P	-1.00		1.00

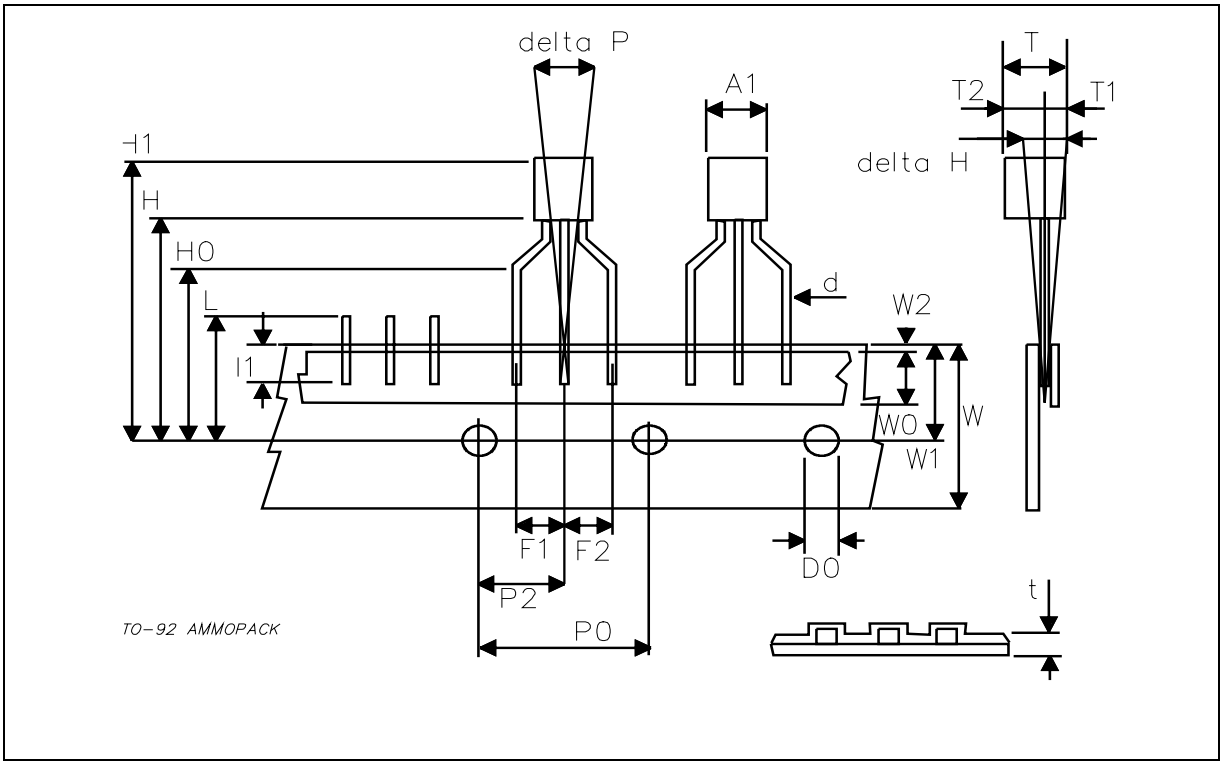

Table 5: Revision History

Date	Release	Change Designator
01-Jul-2004	1	First Release.
11-Feb-2005	2	New table on page 1.