TIP41 (NPN) Series
TIP42 (PNP) Series

RoHS

Nell High Power Products

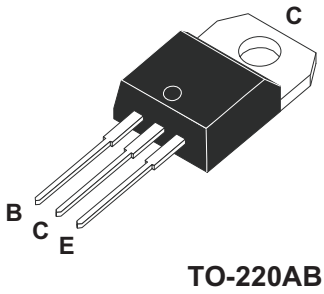
Complementary Silicon Power Transistor
6A/40~100V/65W

FEATURES

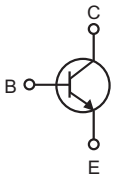
- Complementary NPN-PNP transistors
- Low collector-emitter saturation voltage
- Satisfactory linearity of foward current transfer ratio h_{FE}
- TO-220AB package which can be installed to the heat sink with one screw
- Collector - Emitter Saturation Voltage: $V_{CE(sat)} = 1.5V_{dc}$ (MAX.) @ $I_C = 6A$
- Collector - Emitter Saturation Voltage:
  $V_{CEO(sus)} = 40V_{dc}$ (Min.) - TIP41,TIP42
  $= 60V_{dc}$ (Min.) - TIP41A,TIP42A
  $= 80V_{dc}$ (Min.) - TIP41B, TIP42B
  $= 100V_{dc}$ (Min.) - TIP41C, TIP42C
- DC Current Gain $h_{FE} = 30$ (Min.) @ $I_c = 0.3A$
- High Current Gain - Bandwidth product $f_T = 3.0$ MHz (Min.) @ I_c=0.5A

APPLICATIONS

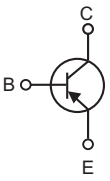
- Audio amplifier
- General purpose switching and amplifier



TO-220AB



TIP41(NPN)



TIP42(PNP)

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C)

SYMBOL	PARAMETER		VALUE				UNIT
			TIP41 TIP42	TIP41A TIP42A	TIP41B TIP42B	TIP41C TIP42C	
V_{CBO}	Collector to base voltage (I_E = 0)		40	60	80	100	V
V_{CEO}	Collector to emitter voltage (I_B = 0)		40	60	80	100	
V_{EBO}	Emitter to base voltage (I_C = 0)		5				
I_C	Collector current		6				A
I_{CM}	Collector peak current (t_p < 0.3mS)		10				
I_B	Base current		2				
P_C	Collector power dissipation (Derate above 25°C)	@T_C = 25°C	65 (0.52)				W(W/°C)
		@T_A = 25°C	2.0 (0.016)				
T_j	Junction temperature		150				°C
T_{stg}	Storage temperature		-65 to 150				
E	Unclamped inductive load energy (Note 1)		62.5				mJ

Note: 1. This rating is based on the capability of the transistor to operate safely is a circuit of:
I_C = 2.5A, L = 20mH, R_{BE} = 100Ω, P.R.F. = 10 Hz, V_{CC} = 10V

THERMAL CHARACTERISTICS (T_C = 25°C)

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th(j-c)}$	Maximum thermal resistance, junction to case	1.67	°C/W
$R_{th(j-a)}$	Maximum thermal resistance, junction to ambient	57	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise specified)						
SYMBOL	**PARAMETER**	**CONDITIONS**		**MIN**	**MAX**	**UNIT**
◎ **Off Characteristics**						
$V_{CEO(SUS)}$	Collector to emitter sustaining voltage (Note 1)	I_C = 30mA, I_B=0	TIP41,TIP42	40		V
			TIP41A,TIP42A	60		
			TIP41B,TIP42B	80		
			TIP41C,TIP42C	100		
I_{CEO}	Collector cutoff current	V_{CE} = 30V, I_B = 0	TIP41,TIP42 TIP41A,TIP42A		0.7	mA
		V_{CE} = 60V, I_B = 0	TIP41B,TIP42B TIP41C,TIP42C			
I_{EBO}	Emitter cutoff current	V_{EB} = 5V, I_C = 0			1.0	
I_{CES}	Collector cutoff current	V_{CE} = 40V, V_{EB} = 0	TIP41,TIP42		400	μA
		V_{CE} = 60V, V_{EB} = 0	TIP41A,TIP42A		400	
		V_{CE} = 80V, V_{EB} = 0	TIP41B,TIP42B		400	
		V_{CE} = 100V, V_{EB} = 0	TIP41C,TIP42C		400	
◎ **On Characteristics**						
h_{FE}	Forward current transfer ratio (DC current gain)	V_{CE} = 4V, I_C = 0.3A		30		
		V_{CE} = 4V, I_C = 3A		15	75	
$V_{CE(sat)}$	Collector to emitter saturation voltage (Note1)	I_C = 6A, I_B = 0.6A			1.5	V
$V_{BE(on)}$	Base to emitter voltage (Note1)	I_C = 6A, V_{CE} = 4V			2.0	
◎ **Dynamic Characteristics**						
f_T	Current gain - Bandwidth product (note 2)	I_C = 0.5A, V_{CE} = 10V, f_{test} = 1MHz		3.0		MHz
h_{fe}	Small signal current gain	I_C = 0.5A, V_{CE} = 10V, f = 1KHz		20		

Note 1. Pulsed : Pulse duration ≤ 300 μS, duty cycle ≤ 2.0%.
Note 2. $f_T = |h_{fe}| \cdot f_{TEST}$
Note 3. For PNP type voltage and current are negative.

Fig.1 Power Derating

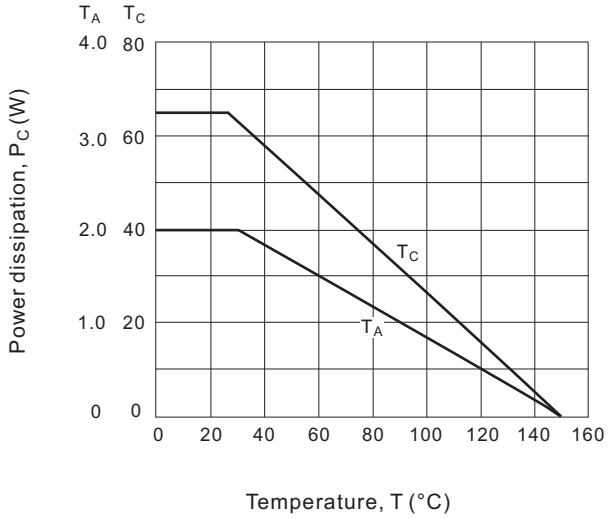
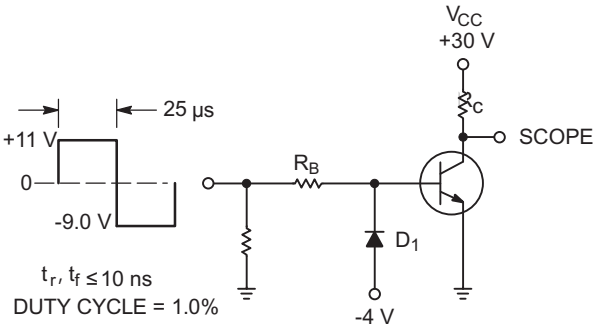


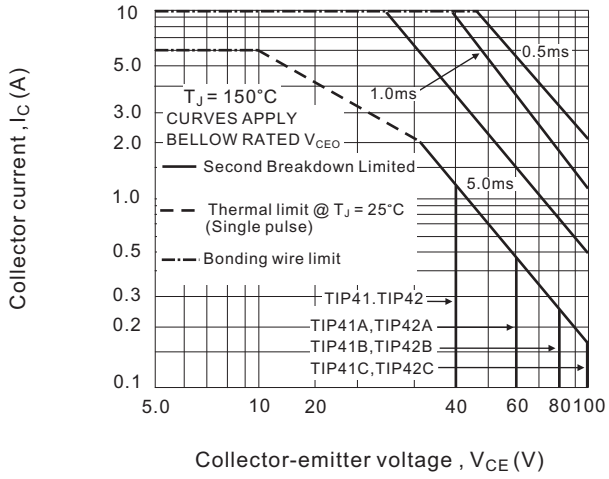
Fig.2 Switching time test circuit



R_B and R_C VARIED TO OBTAIN DESIRED CURRENT LEVELS

D_1 MUST BE FAST RECOVERY TYPE, e.g.:
1N5825 USED ABOVE $I_B \approx 100$ mA
MSD6100 USED BELOW $I_B \approx 100$ mA

Fig.3 Active region safe operating area



There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate I_C-V_{CE} limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curve indicate.

The data of fig.3 is based on $T_{J(pk)}$ = 150°C; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to10% provided $T_{J(pk)} \leq 150$°C. $T_{J(pk)}$ may be calulated form the data in Figure 13. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

Fig.4 Turn-on time

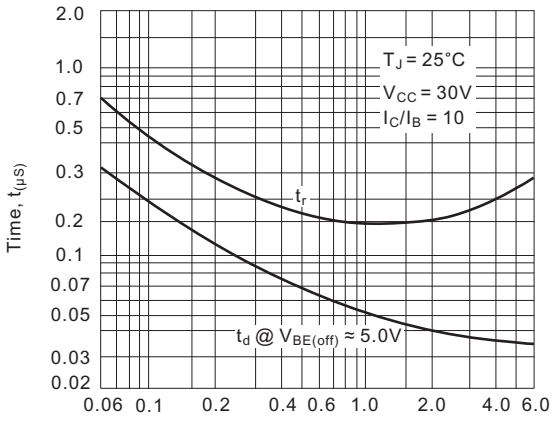


Fig.5 Turn-off time

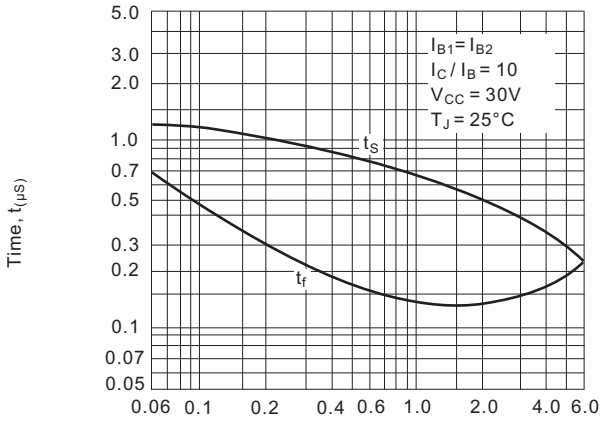


Fig.6 Capacitance

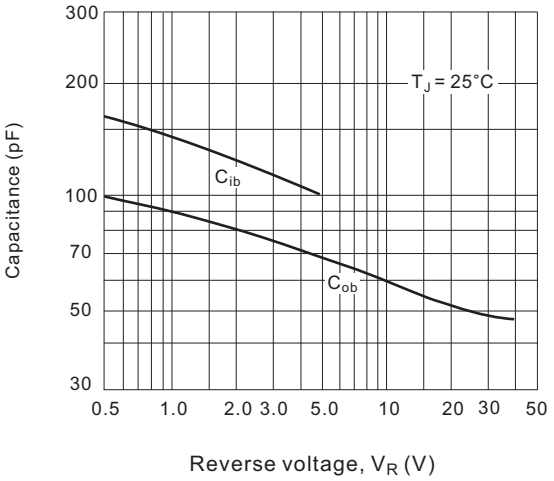


Fig.7 DC Current gain

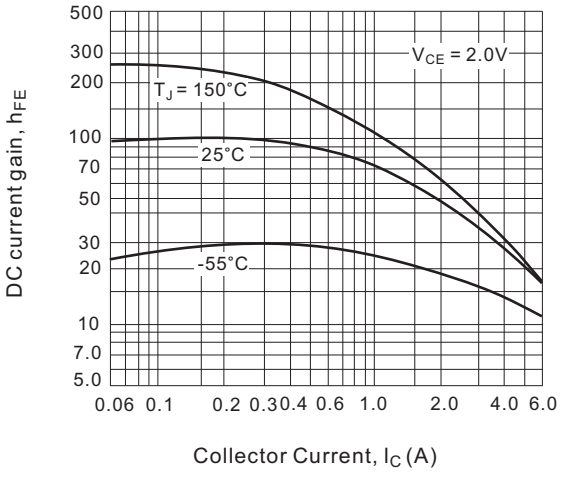


Fig.8 Collector saturation region

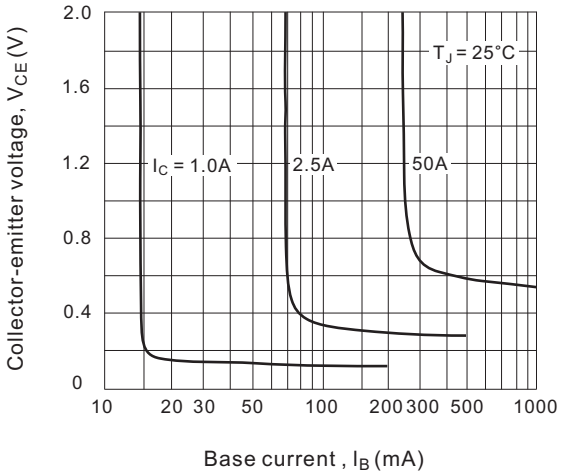


Fig.9 "On"voltage

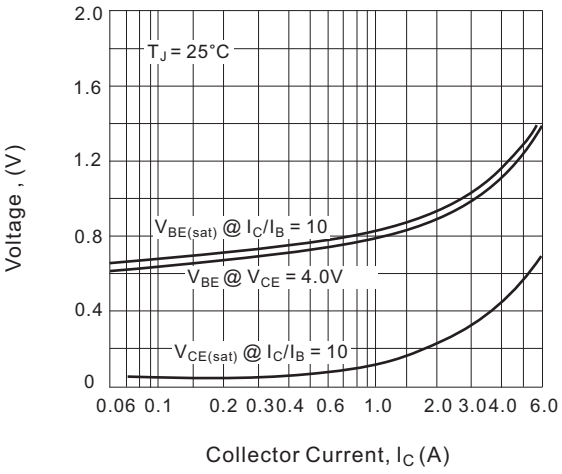


Fig.10 Temperature coeffcients

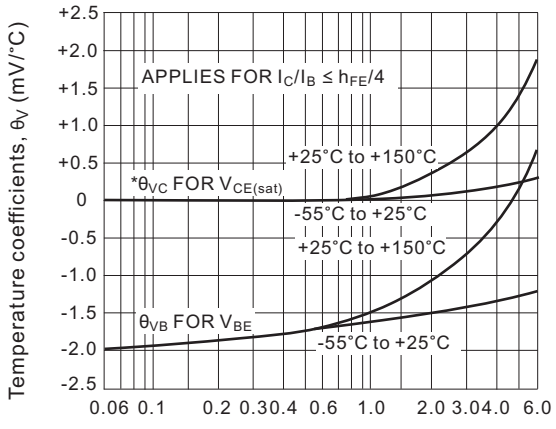


Fig.11 Collector cut-off region

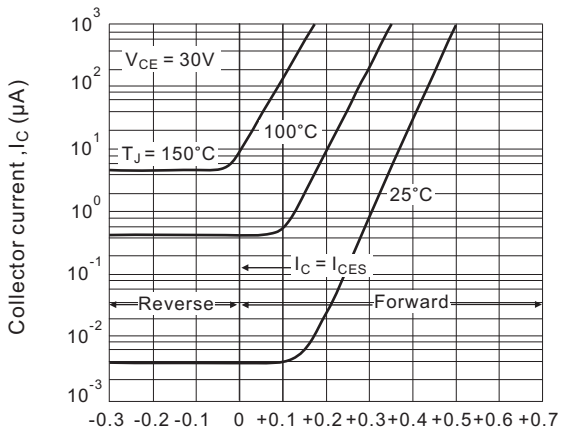


Fig.12 Effects of base-emitter resistance

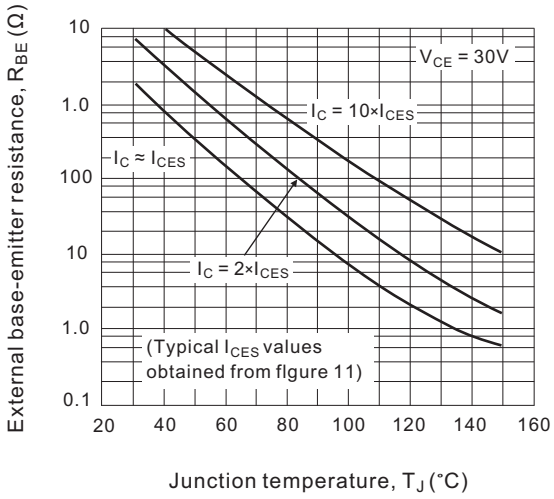
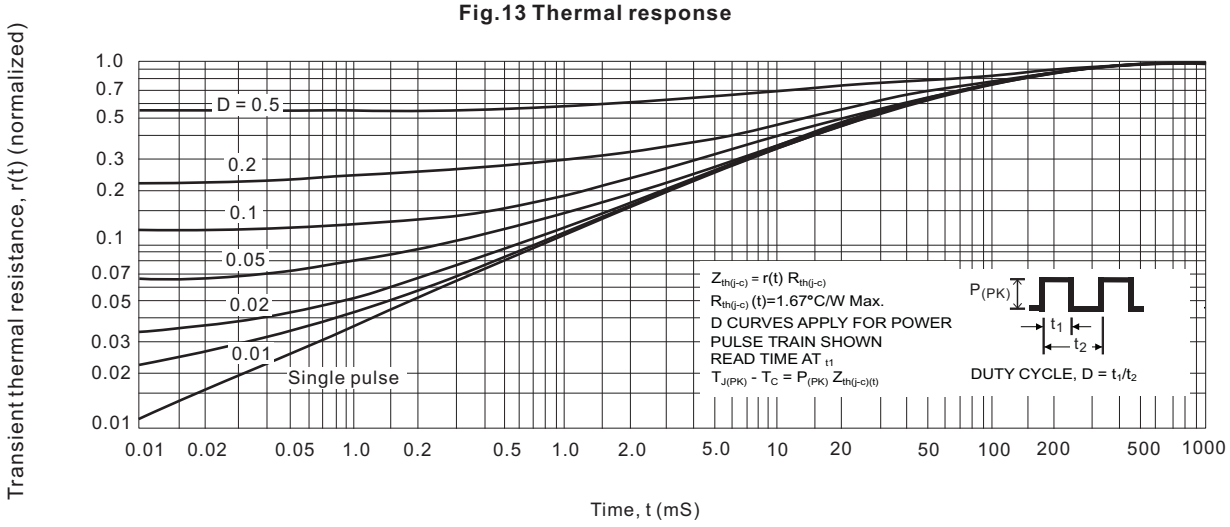


Fig.13 Thermal response



Case Style

TO-220AB