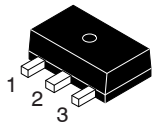
Bipolar Transistor

(–)160 V, (–)0.7 A, Low V_{CE}(sat), (PNP) NPN Single PCP

2SA1418, 2SC3648



SOT–89 / PCP–1
CASE 419AU

Features

- Adoption of FBET, MBIT Processes
- Fast Switching Speed
- Ultrasmall Size Making it Easy to Provide High–density, Small–sized Hybrid IC's
- High Breakdown Voltage and Large Current Capacity
- This is a Pb–Free Device

Applications

- Color TV Audio Output, Inverter

Specifications

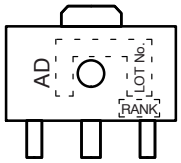
( ): 2SA1418

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

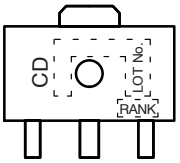
Parameter	Symbol	Conditions	Ratings	Unit
Collector–to–Base Voltage	V_{CBO}		(–)180	V
Collector–to–Emitter Voltage	V_{CEO}		(–)160	V
Emitter–to–Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)0.7	A
Collector Current (Pulse)	I_{CP}		(–)1.5	A
Collector Dissipation	P_C		500	mW
		When mounted on ceramic substrate (250 mm^2 x 0.8 mm)	1.3	W
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		–55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

MARKING DIAGRAM

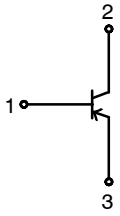


2SA1418

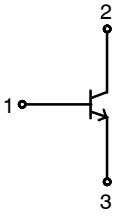


2SC3648

ELECTRICAL CONNECTION



2SA1418



2SC3648

ORDERING INFORMATION

Device	Package	Shipping†
2SA1418S–TD–E	PCP (Pb–Free)	1000 / Tape & Reel
2SC3648S–TD–E		
2SC3648T–TD–E		

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

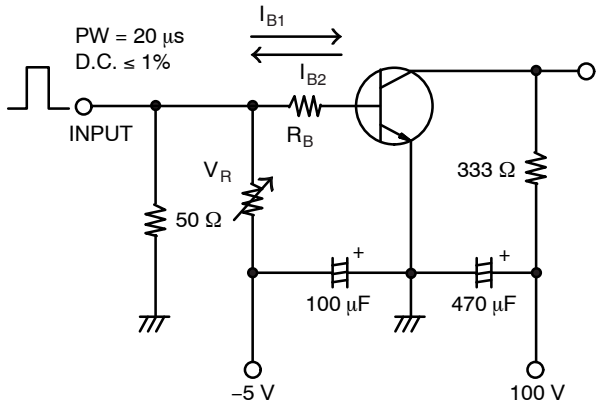
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector Cutoff Current	I_{CBO}	V_{CB} = (−)120 V, I_E = 0 A	−	−	(−)0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = (−)4 V, I_C = 0 A	−	−	(−)0.1	μA
DC Current Gain	$h_{FE}1$	V_{CE} = (−)5 V, I_C = (−)100 mA	100*	−	400*	
	$h_{FE}2$	V_{CE} = (−)5 V, I_C = (−)10 mA	90	−	−	
Gain−Bandwidth Product	f_T	V_{CE} = (−)10 V, I_C = (−)50 mA	−	120	−	MHz
Output Capacitance	Cob	V_{CB} = (−)10 V, f = 1 MHz	−	(11)8	−	pF
Collector−to−Emitter Saturation Voltage	V_{CE}(sat)	I_C = (−)250 mA, I_B = (−)25 mA	−	(−0.2) 0.12	(−0.5) 0.4	V
Base−to−Emitter Saturation Voltage	V_{BE}(sat)	I_C = (−)250 mA, I_B = (−)25 mA	−	(−)0.85	(−)1.2	V
Collector−to−Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = (−)10 μA, I_E = 0 A	(−)180	−	−	V
Collector−to−Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = (−)1 mA, R_{BE} = ∞	(−)160	−	−	V
Emitter−to−Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = (−)10 μA, I_C = 0 A	(−)6	−	−	V
Turn−ON Time	t_{on}	See specified Test Circuit	−	(60) 50	−	ns
Storage Time	t_{stg}		−	(900) 1000	−	ns
Fall Time	t_f		−	(60) 60	−	ns

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
* The 2SA1418 / 2SC3648 are classified by 100 mA hFE as follows:

Rank	R	S	T
h_{FE}	100 to 200	140 to 280	200 to 400

Switching Time Test Circuit



$I_C = 20I_{B1} = -20I_{B2}$ = 300 mA
(For PNP, the polarity is reversed)

Figure 1. Switching Time Test Circuit

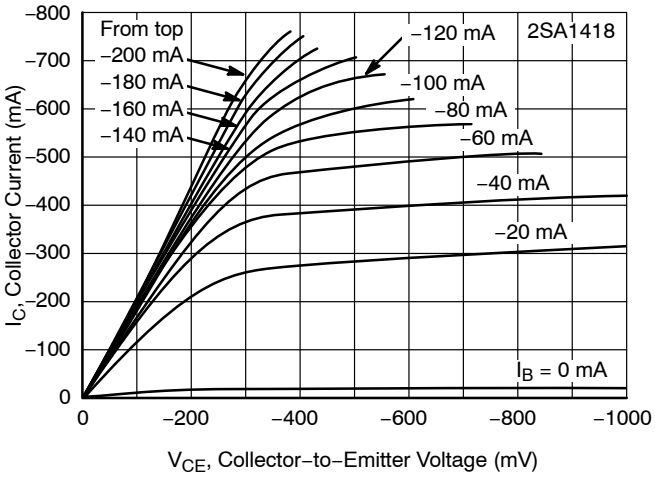


Figure 2. I_C – V_{CE}

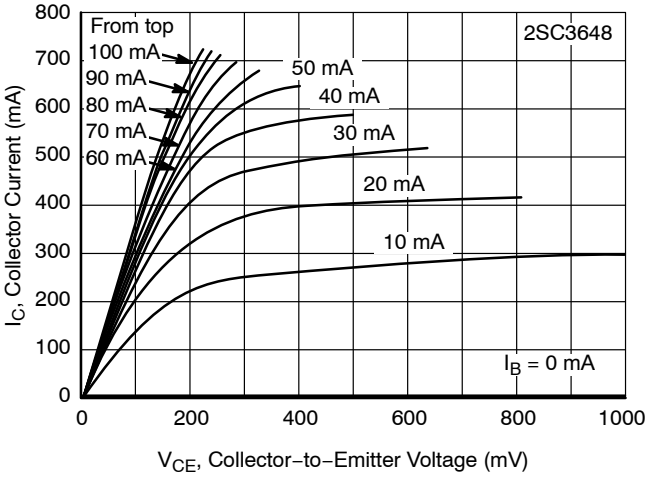


Figure 3. I_C – V_{CE}

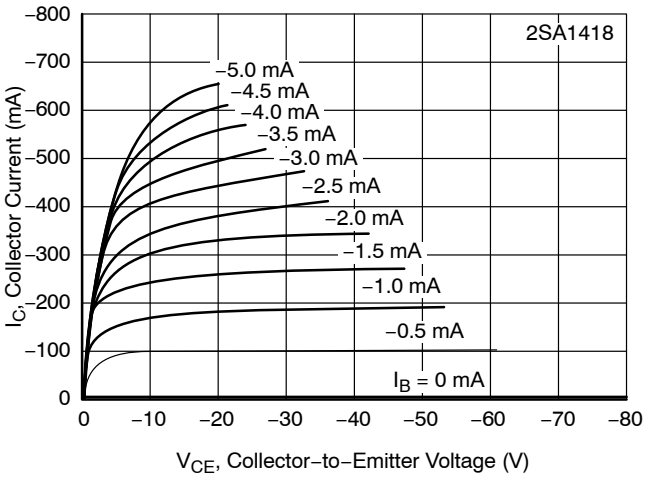


Figure 4. I_C – V_{CE}

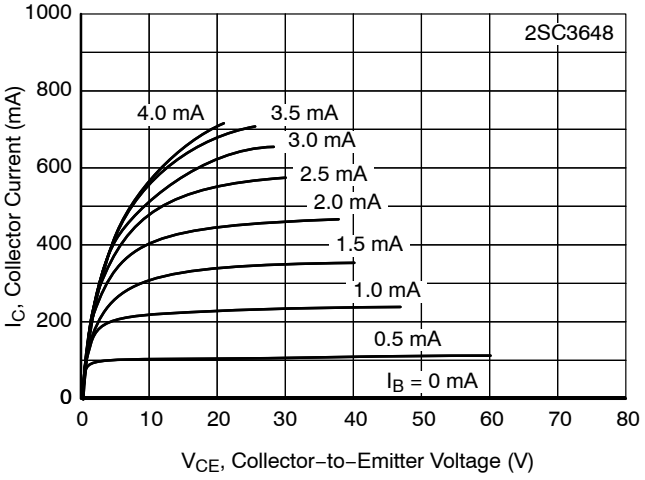


Figure 5. I_C – V_{CE}

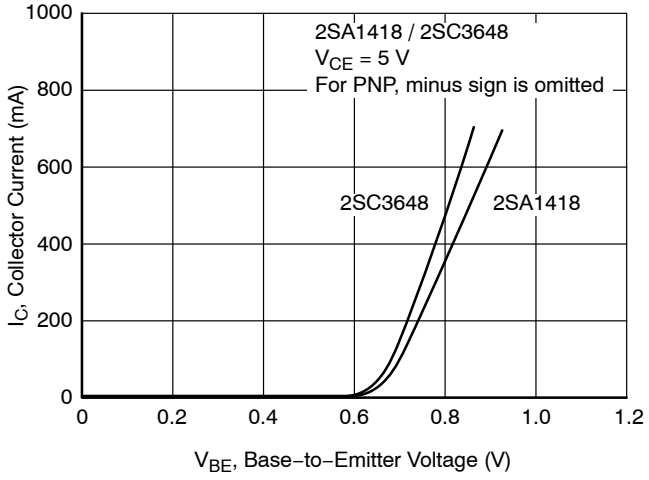


Figure 6. I_C – V_{BE}

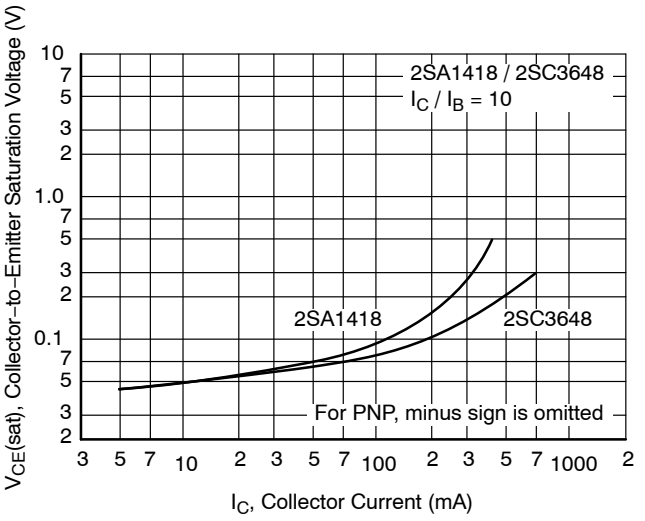


Figure 7. V_{CE}(sat) – I_C

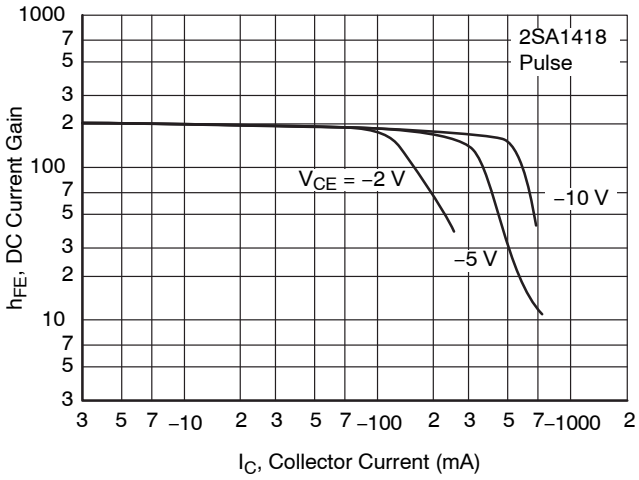


Figure 8. h_{FE} – I_C

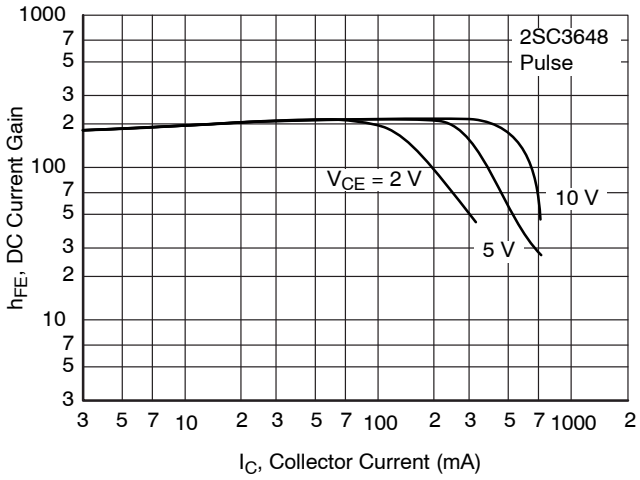


Figure 9. h_{FE} – I_C

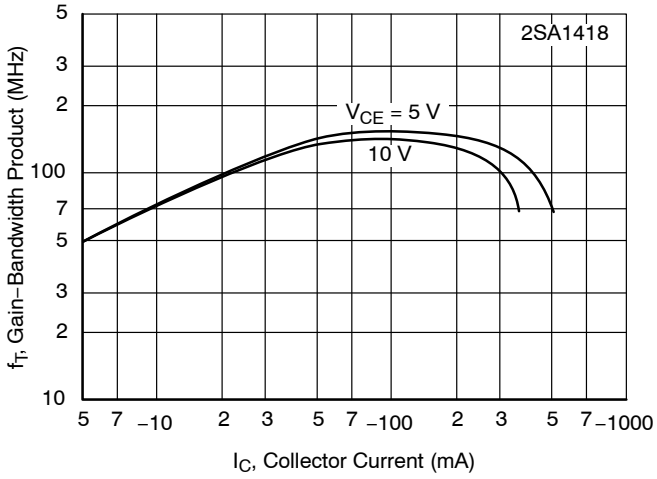


Figure 10. f_T – I_C

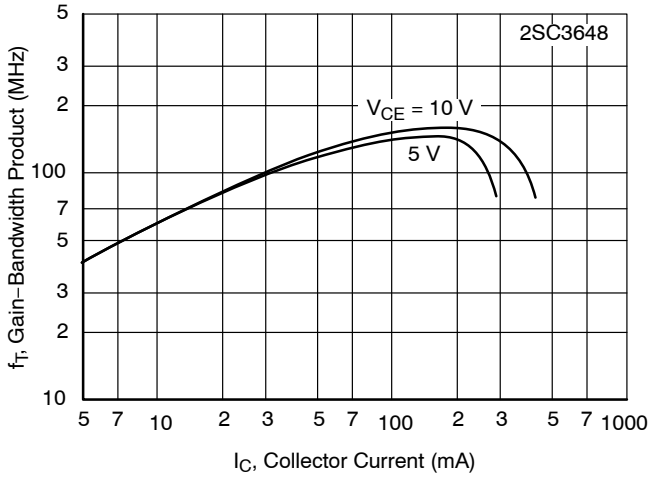


Figure 11. f_T – I_C

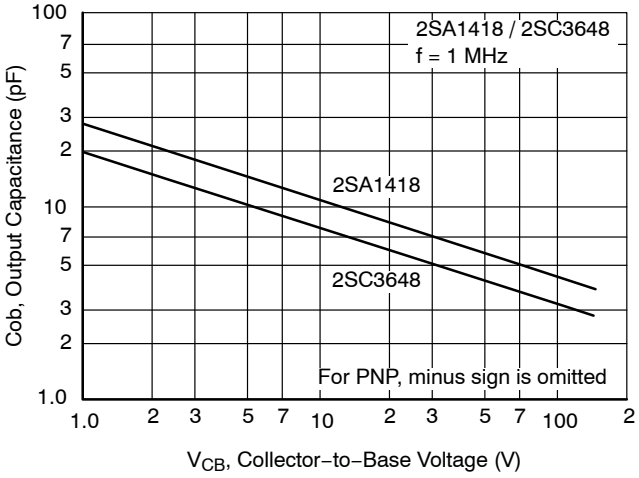


Figure 12. Cob – V_{CB}

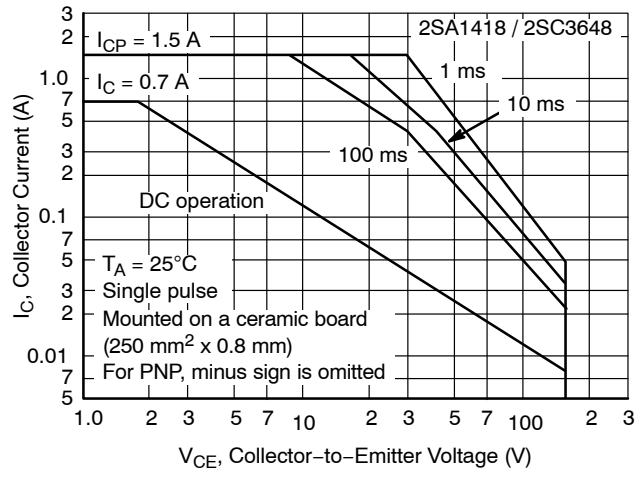


Figure 13. ASO

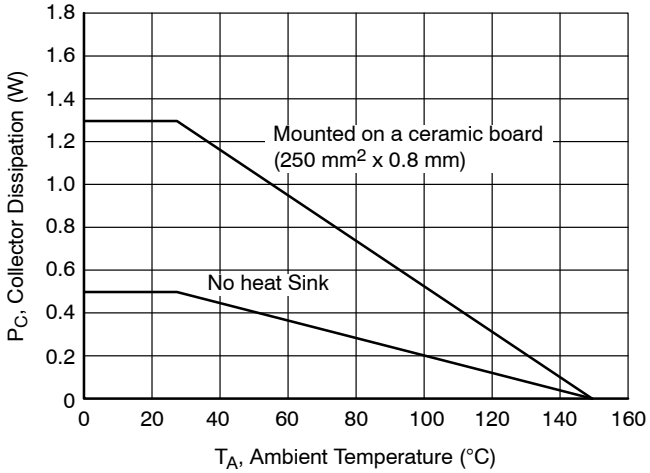
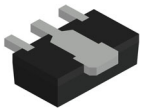


Figure 14. P_C – T_A



SOT−89 4.50x2.50x1.50 1.50P
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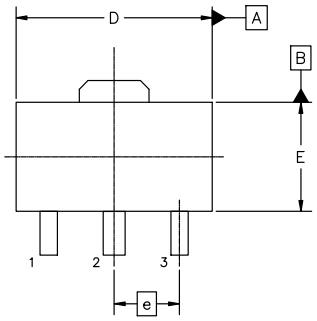
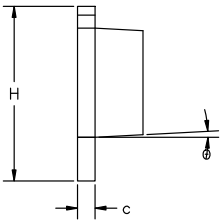
ISSUE A

DATE 21 MAY 2025



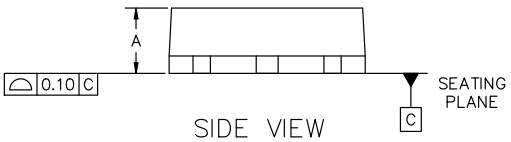
TOP VIEW



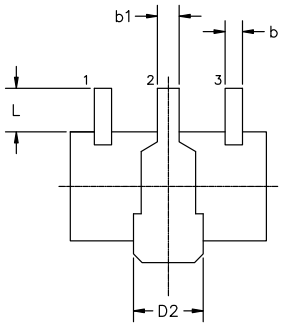
END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. LEAD THICKNESS INCLUDES LEAD FINISH.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

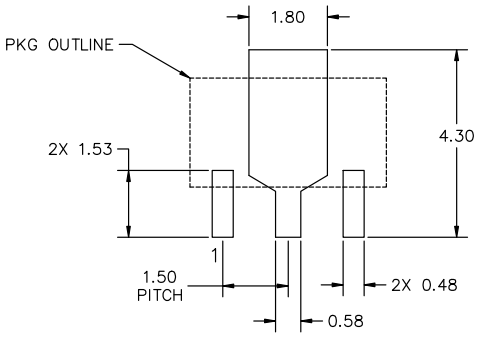
MILLIMETERS			
DIM	MIN	NOM	MAX
A	1.40	1.50	1.60
b	0.35	0.40	0.48
b1	0.40	0.50	0.55
c	0.37	0.40	0.43
D	4.40	4.50	4.60
D2	1.40	1.60	1.80
E	2.40	2.50	2.60
e	1.50 BSC		
H	3.80	4.00	4.20
L	0.80	1.00	1.20
θ	0°	−−−	3°



SIDE VIEW



BOTTOM VIEW



RECOMMENDED MOUNTING FOOTPRINT

*For additional information on our Pb−Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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