

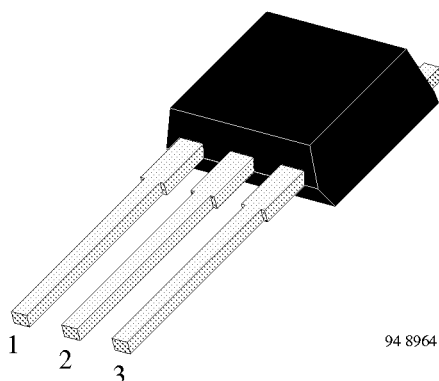
Silicon NPN High Voltage Switching Transistor

Features

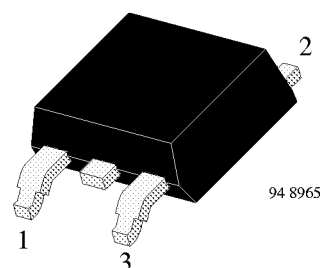
- Monolithic integrated C-E-free-wheel diode
- Simple-sWitch-Off Transistor (SWOT)
- HIGH SPEED technology
- Planar passivation
- 100 kHz switching rate
- Very low switching losses
- Very low dynamic saturation
- Very low operating temperature
- Optimized RBSOA
- High reverse voltage

Applications

Electronic lamp ballast circuits
Switch-mode power supplies



BUD725D
1 Base 2 Collector 3 Emitter



BUD725D -SMD
1 Base 2 Collector 3 Emitter

Absolute Maximum Ratings

$T_{case} = 25^{\circ}C$, unless otherwise specified

Parameter	Test Conditions	Symbol	Value	Unit
Collector-emitter voltage		V_{CEO}	400	V
		V_{CEW}	500	V
		V_{CES}	700	V
Emitter-base voltage		V_{EBO}	11	V
Collector current		I_C	5	A
Collector peak current		I_{CM}	7.5	A
Base current		I_B	2.5	A
Base peak current		I_{BM}	3.5	A
Total power dissipation	$T_{case} \leq 60^{\circ}C$	P_{tot}	25	W
Junction temperature		T_j	150	$^{\circ}C$
Storage temperature range		T_{stg}	-65 to +150	$^{\circ}C$

Maximum Thermal Resistance

$T_{\text{case}} = 25^{\circ}\text{C}$, unless otherwise specified

Parameter	Test Conditions	Symbol	Value	Unit
Junction case		R_{thJC}	3.6	K/W

Electrical Characteristics

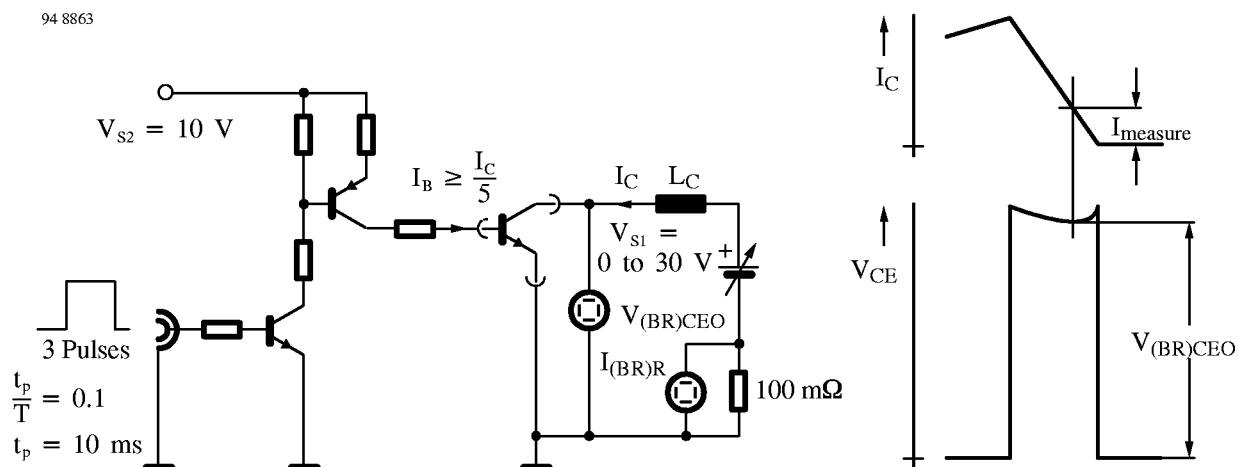
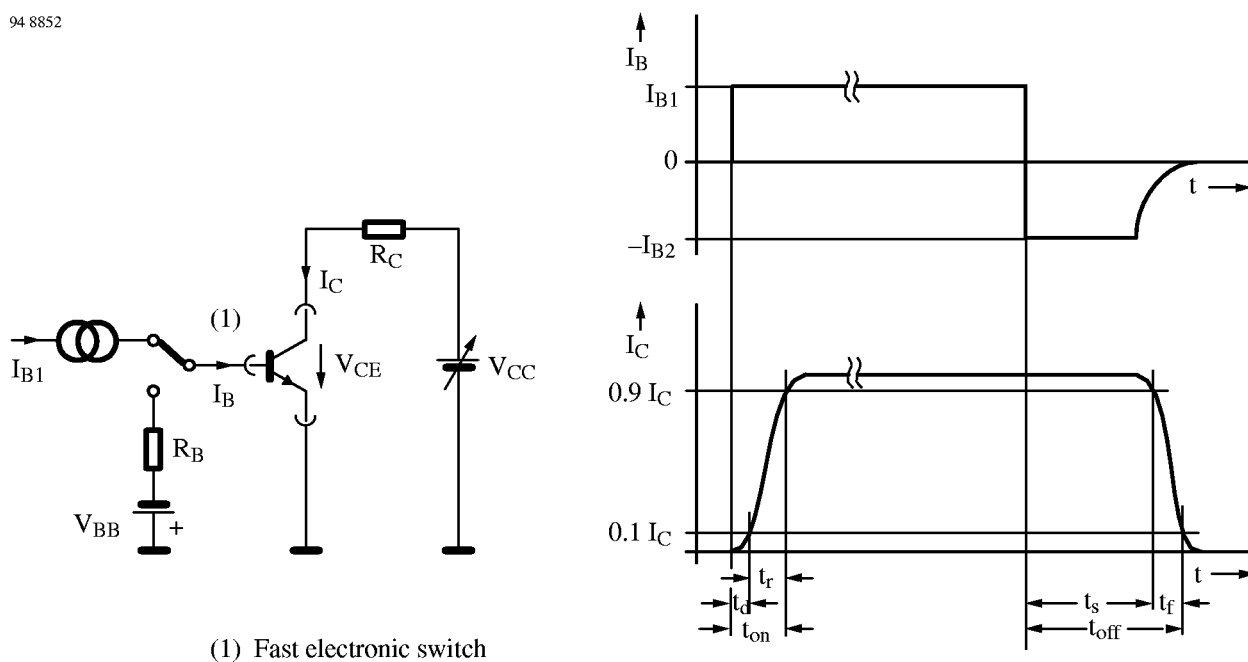
$T_{\text{case}} = 25^{\circ}\text{C}$, unless otherwise specified

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Transistor						
Collector cut-off current	$V_{\text{CES}} = 700 \text{ V}$	I_{CES}			50	μA
	$V_{\text{CES}} = 700 \text{ V}; T_{\text{case}} = 150^{\circ}\text{C}$	I_{CES}			0.5	mA
Collector-emitter breakdown voltage (figure 1)	$I_{\text{C}} = 300 \text{ mA}; L = 125 \text{ mH}; I_{\text{measure}} = 100 \text{ mA}$	$V_{(\text{BR})\text{CEO}}$	400			V
Emitter-base breakdown voltage	$I_{\text{E}} = 1 \text{ mA}$	$V_{(\text{BR})\text{EBO}}$	11			V
Collector-emitter saturation voltage	$I_{\text{C}} = 850 \text{ mA}; I_{\text{B}} = 210 \text{ mA}$	V_{CEsat}			0.2	V
Base-emitter saturation voltage	$I_{\text{C}} = 850 \text{ mA}; I_{\text{B}} = 210 \text{ mA}$	V_{BEsat}			1	V
DC forward current transfer ratio	$V_{\text{CE}} = 2 \text{ V}; I_{\text{C}} = 10 \text{ mA}$	h_{FE}	10			
	$V_{\text{CE}} = 2 \text{ V}; I_{\text{C}} = 850 \text{ mA}$	h_{FE}	10			
	$V_{\text{CE}} = 5 \text{ V}; I_{\text{C}} = 5 \text{ A}$	h_{FE}	4			
Collector-emitter working voltage	$V_{\text{S}} = 50 \text{ V}; L = 1 \text{ mH}; I_{\text{C}} = 5 \text{ A}; I_{\text{B1}} = 1.7 \text{ A}; -I_{\text{B2}} = 0.5 \text{ A}; -V_{\text{BB}} = 5 \text{ V}$	V_{CEW}	500			V
Dynamic saturation voltage	$I_{\text{C}} = 2.5 \text{ A}; I_{\text{B}} = 0.5 \text{ A}; t = 1 \mu\text{s}$	V_{CEsatdyn}			12	V
	$I_{\text{C}} = 2.5 \text{ A}; I_{\text{B}} = 0.5 \text{ A}; t = 3 \mu\text{s}$	V_{CEsatdyn}			3	V
Gain bandwidth product	$I_{\text{C}} = 500 \text{ mA}; V_{\text{CE}} = 10 \text{ V}; f = 1 \text{ MHz}$	f_{T}	4			MHz
Free-wheel diode						
Forward voltage	$I_{\text{F}} = 1.67 \text{ A}$	V_{F}			1.2	V

Switching Characteristics

$T_{\text{case}} = 25^{\circ}\text{C}$, unless otherwise specified

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Application specific switching time						
measured with Nylos3		t_{x}	0.55		0.9	μs
Resistive load (figure 2)						
Turn on time	$I_{\text{C}} = 0.85 \text{ A}; I_{\text{B1}} = 0.2 \text{ A}; -I_{\text{B2}} = 0.4 \text{ A}; V_{\text{S}} = 250 \text{ V}$	t_{on}			0.2	μs
Storage time		t_{s}			3	μs
Fall time		t_{f}			0.4	μs


Figure 1. Test circuit for $V_{(BR)CEO}$


(1) Fast electronic switch

Figure 2. Test circuit for switching characteristics – resistive load

Typical Characteristics ($T_{\text{case}} = 25_{\text{C}}$ unless otherwise specified)

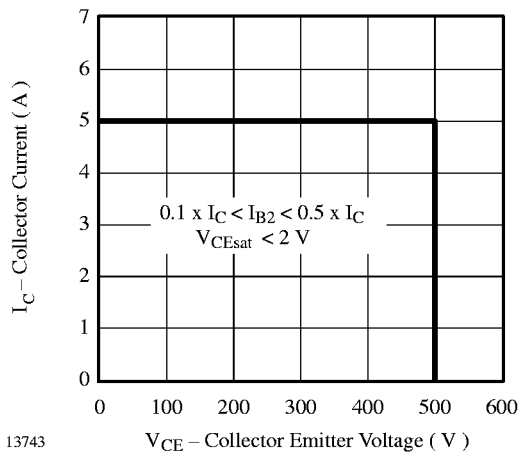


Figure 3. V_{CEW} - Diagram

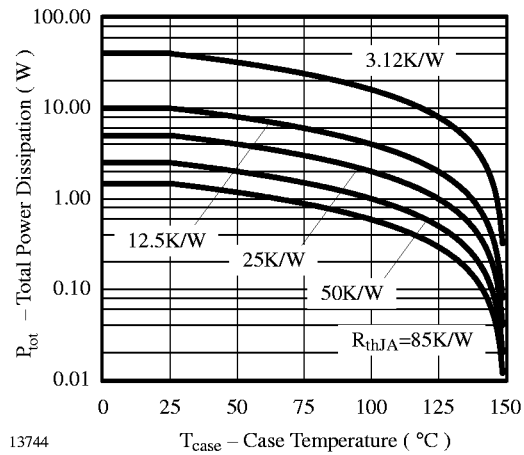


Figure 6. P_{tot} vs. T_{case}

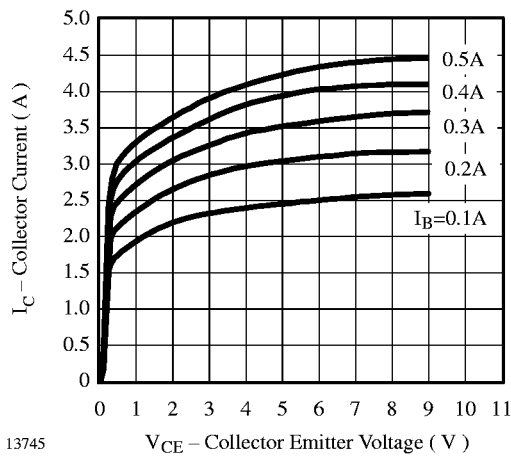


Figure 4. I_{C} vs. V_{CE}

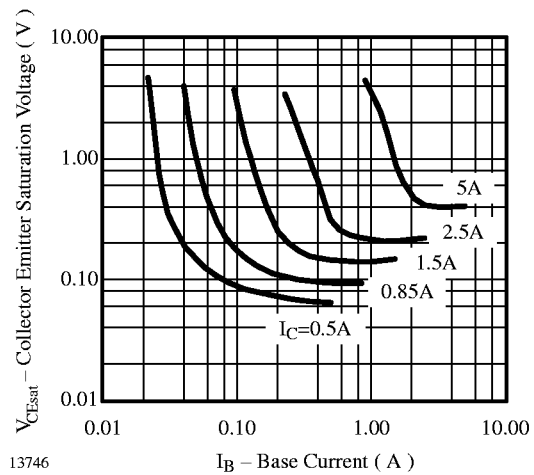


Figure 7. V_{CEsat} vs. I_{B}

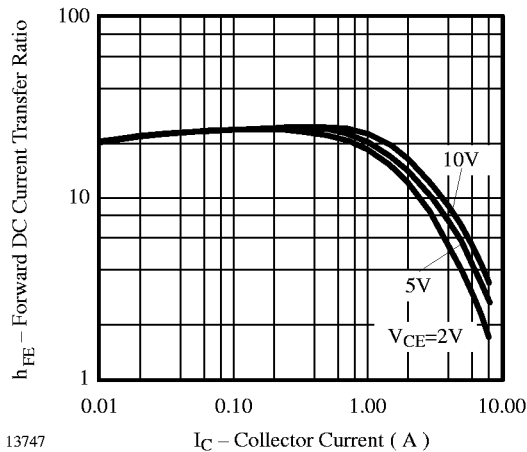


Figure 5. h_{FE} vs. I_{C}

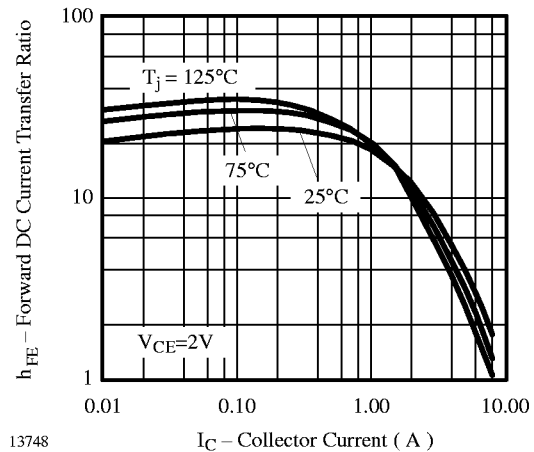


Figure 8. h_{FE} vs. I_{C}

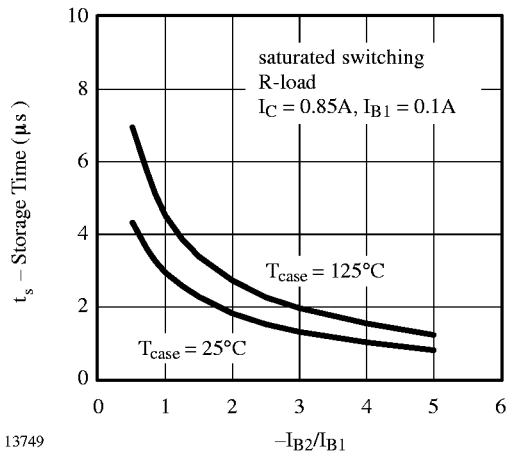


Figure 9. t_s vs. $-I_{B2}/I_{B1}$

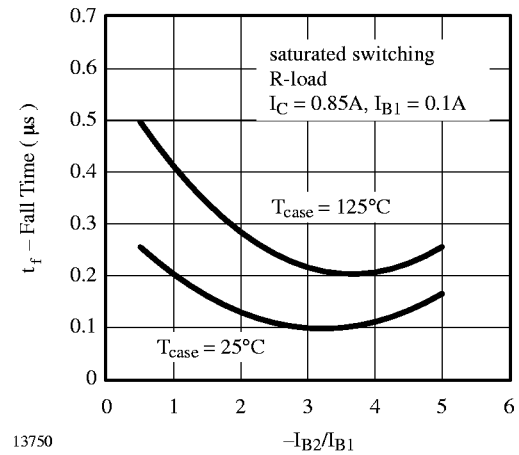


Figure 12. t_f vs. $-I_{B2}/I_{B1}$

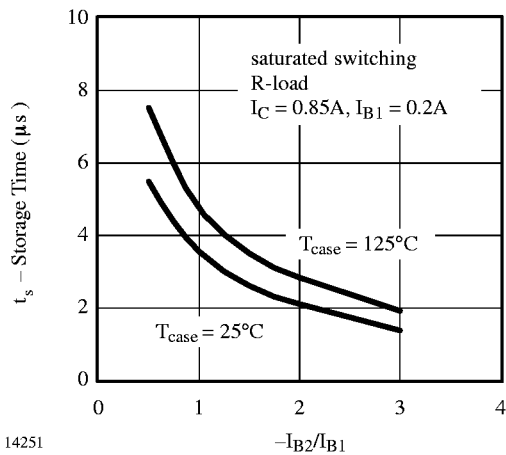


Figure 10. t_s vs. $-I_{B2}/I_{B1}$

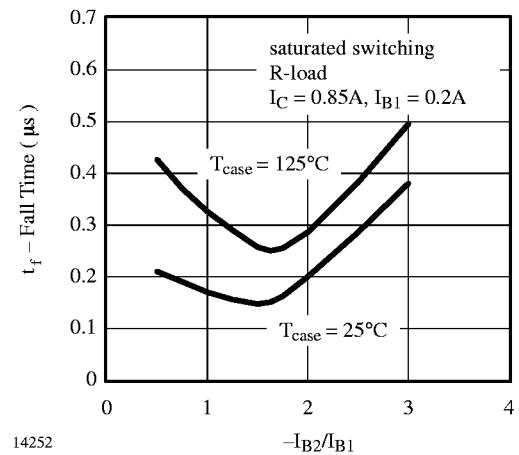


Figure 13. t_f vs. $-I_{B2}/I_{B1}$

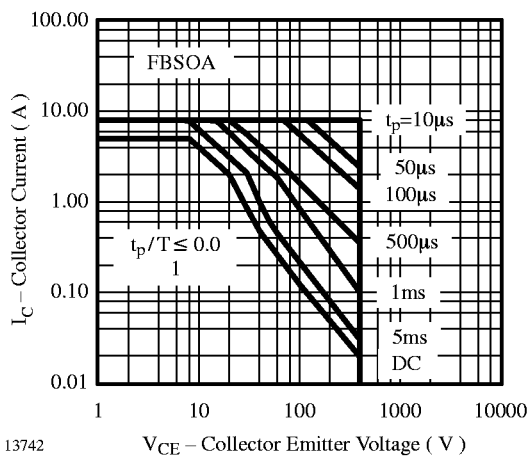


Figure 11. I_C vs. V_{CE}

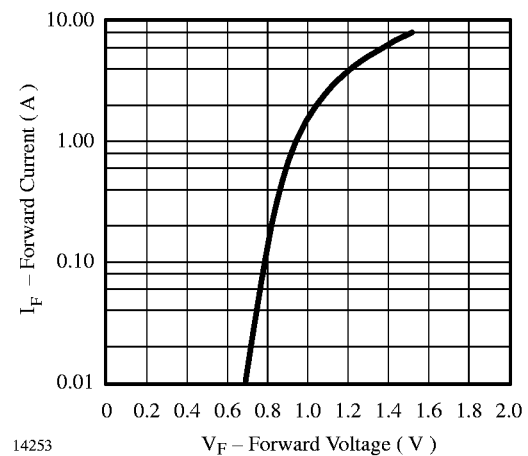
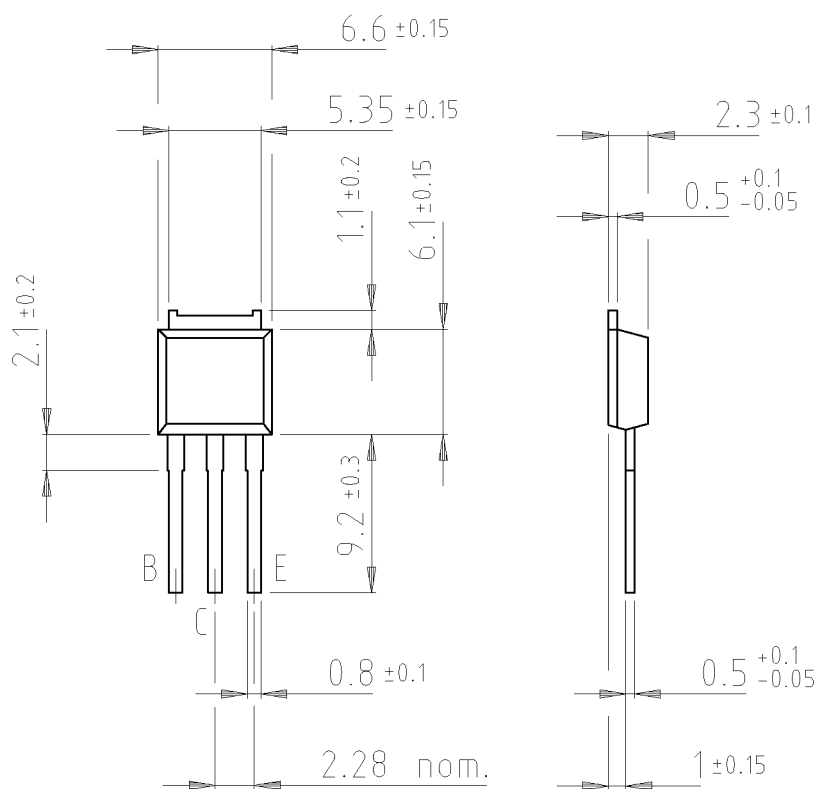
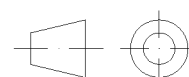


Figure 14. I_F vs. V_F

Dimensions in mm

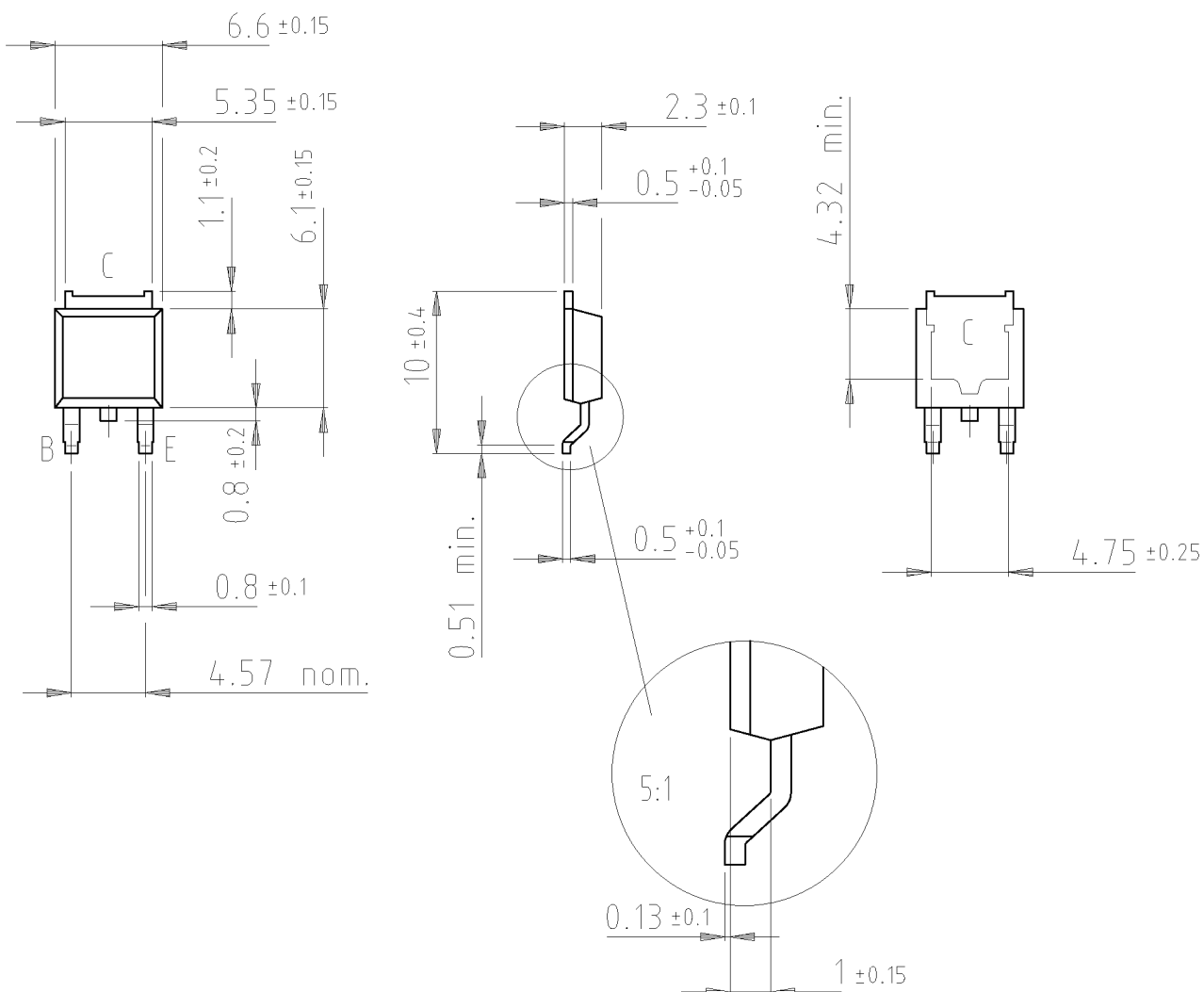


Plastic case JEDEC TO 251
Collector connected with metallic surface



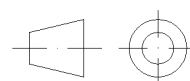
technical drawings
according to DIN
specifications

14292



Plastic case JEDEC TO 252
Collector connected with metallic surface

14293



technical drawings
according to DIN
specifications

For ordering TO 252 add SMD to the type number (i.e. BUD725D –SMD)