TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA7805F, TA78057F, TA7806F, TA7807F, TA7808F, TA7809F, TA7810F, TA7812F, TA7815F, TA7818F, TA7820F, TA7824F

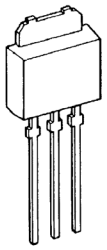
Three Terminal Positive Voltage Regulators

5 V, 5.7 V, 6 V, 7 V, 8 V, 9 V, 10 V, 12 V, 15 V, 18 V, 20 V, 24 V

Features

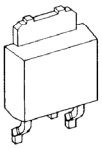
- Suitable for CMOS, TTL, the power supply of the digital ICs
- Internal thermal overload protection.
- Internal short circuit current limiting.
- Maximum output current of 1 A.
- Packaged in POWER MOLD.

TA78XXF



HSIP3-P-2.30B

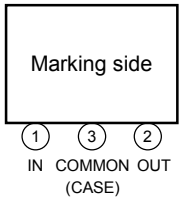
TA78XXF
(LBSTA1)
(TE16L / R)



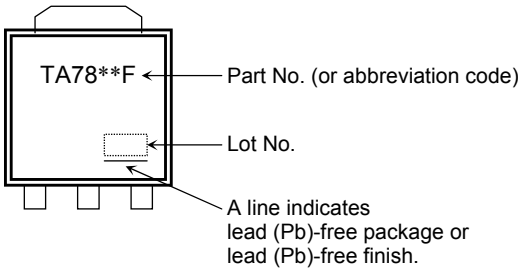
HSOP3-P-2.30A

Weight
HSIP3-P-2.30B: 0.36 g (typ.)
HSOP3-P-2.30A: 0.36 g (typ.)

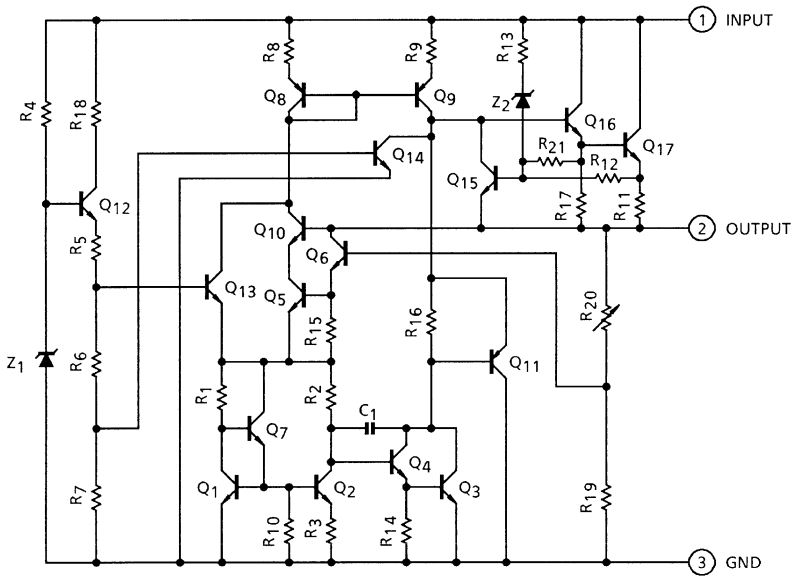
Pin Assignment



Marking



Equivalent Circuit



Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Input voltage	TA7805F	V_{IN}	35	V
	TA78057F			
	TA7806F			
	TA7807F			
	TA7808F			
	TA7809F			
	TA7810F			
	TA7812F			
	TA7815F			
	TA7818F		40	
	TA7820F			
	TA7824F			
Power dissipation	(Ta = 25°C)	P_D	1	W
	(Tc = 25°C)		10	
Operating temperature		T_{opr}	−30~85	°C
Storage temperature		T_{stg}	−55~150	°C
Junction temperature		T_j	150	°C
Thermal resistance		$R_{th\ (j\text{-}c)}$	12.5	°C/W
		$R_{th\ (j\text{-}a)}$	125	

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

TA7805F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 10 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		4.8	5.0	5.2	V
Line regulation	Reg·line	1	T_j = 25°C	7.0 V ≤ V_{IN} ≤ 25 V	—	3	100	mV
				8.0 V ≤ V_{IN} ≤ 12 V	—	1	50	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	15	100	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	5	50	
Output voltage	V_{OUT}	1	T_j = 25°C	7.0 V ≤ V_{IN} ≤ 20 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	4.75	—	5.25	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.2	8.0	mA
Quiescent current change	ΔI_B	1	7.0 V ≤ V_{IN} ≤ 25 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.3	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	50	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 10 V ≤ V_{IN} ≤ 18 V I_{OUT} = 50 mA, T_j = 25°C		57	73	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	1.6	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−0.6	—	mV/°C

TA78057F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 10.7 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		5.47	5.7	5.93	V
Line regulation	Reg·line	1	T_j = 25°C	7.7 V ≤ V_{IN} ≤ 25 V	—	4	110	mV
				8.7 V ≤ V_{IN} ≤ 12.7 V	—	2	55	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	15	110	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	5	55	
Output voltage	V_{OUT}	1	T_j = 25°C	7.7 V ≤ V_{IN} ≤ 20.7 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	5.42	—	5.98	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.3	8.0	mA
Quiescent current change	ΔI_B	1	7.7 V ≤ V_{IN} ≤ 25 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.3	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	55	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 8.8 V ≤ V_{IN} ≤ 18.8 V, I_{OUT} = 50 mA, T_j = 25°C		56	72	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	1.5	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−0.7	—	mV/°C

TA7806F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 11 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		5.75	6.0	6.25	V
Line regulation	Reg·line	1	T_j = 25°C	8.0 V ≤ V_{IN} ≤ 25 V	—	4	120	mV
				9 V ≤ V_{IN} ≤ 13 V	—	2	60	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	15	120	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	5	60	
Output voltage	V_{OUT}	1	T_j = 25°C	8 V ≤ V_{IN} ≤ 21 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	5.7	—	6.3	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.3	8.0	mA
Quiescent current change	ΔI_B	1	8.0 V ≤ V_{IN} ≤ 25 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.3	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	55	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 11 V ≤ V_{IN} ≤ 19 V I_{OUT} = 50 mA, T_j = 25°C		56	72	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	1.5	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−0.7	—	mV/°C

TA7807F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 12 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		6.72	7.0	7.28	V
Line regulation	Reg·line	1	T_j = 25°C	9 V ≤ V_{IN} ≤ 25 V	—	5	140	mV
				10 V ≤ V_{IN} ≤ 14 V	—	2	70	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	15	140	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	5	70	
Output voltage	V_{OUT}	1	T_j = 25°C	9 V ≤ V_{IN} ≤ 22 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	6.65	—	7.35	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.3	8.0	mA
Quiescent current change	ΔI_B	1	9 V ≤ V_{IN} ≤ 25 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.3	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	60	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 12 V ≤ V_{IN} ≤ 20 V I_{OUT} = 50 mA, T_j = 25°C		54	70	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	1.3	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−0.8	—	mV/°C

TA7808F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 14 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		7.7	8.0	8.3	V
Line regulation	Reg·line	1	T_j = 25°C	10.5 V ≤ V_{IN} ≤ 25 V	—	6	160	mV
				11 V ≤ V_{IN} ≤ 17 V	—	2	80	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	12	160	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	4	80	
Output voltage	V_{OUT}	1	T_j = 25°C	10.5 V ≤ V_{IN} ≤ 23 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	7.6	—	8.4	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.3	8.0	mA
Quiescent current change	ΔI_B	1	10.5 V ≤ V_{IN} ≤ 25 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.0	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	70	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 14 V ≤ V_{IN} ≤ 21.5 V I_{OUT} = 50 mA, T_j = 25°C		53	69	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	1.1	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−1.0	—	mV/°C

TA7809F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 15 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		8.64	9.0	9.36	V
Line regulation	Reg·line	1	T_j = 25°C	11.5 V ≤ V_{IN} ≤ 26 V	—	7.0	180	mV
				13 V ≤ V_{IN} ≤ 19 V	—	2.5	90	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	12	180	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	4	90	
Output voltage	V_{OUT}	1	T_j = 25°C	11.5 V ≤ V_{IN} ≤ 24 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	8.55	—	9.45	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.3	8.0	mA
Quiescent current change	ΔI_B	1	11.5 V ≤ V_{IN} ≤ 26 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.0	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	75	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 15 V ≤ V_{IN} ≤ 22.5 V I_{OUT} = 50 mA, T_j = 25°C		51	67	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	1.0	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−1.1	—	mV/°C

TA7810F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 16 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		9.6	10.0	10.4	V
Line regulation	Reg·line	1	T_j = 25°C	12.5 V ≤ V_{IN} ≤ 27 V	—	8	200	mV
				14 V ≤ V_{IN} ≤ 20 V	—	2.5	100	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	12	200	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	4	100	
Output voltage	V_{OUT}	1	T_j = 25°C	12.5 V ≤ V_{IN} ≤ 25 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	9.5	—	10.5	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.3	8.0	mA
Quiescent current change	ΔI_B	1	12.5 V ≤ V_{IN} ≤ 27 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.0	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	80	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 16 V ≤ V_{IN} ≤ 23.5 V I_{OUT} = 50 mA, T_j = 25°C		50	66	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	0.9	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−1.3	—	mV/°C

TA7812F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 19 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		11.5	12.0	12.5	V
Line regulation	Reg·line	1	T_j = 25°C	14.5 V ≤ V_{IN} ≤ 30 V	—	10	240	mV
				16 V ≤ V_{IN} ≤ 22 V	—	3	120	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	12	240	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	4	120	
Output voltage	V_{OUT}	1	T_j = 25°C	14.5 V ≤ V_{IN} ≤ 27 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	11.4	—	12.6	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.3	8.0	mA
Quiescent current change	ΔI_B	1	14.5 V ≤ V_{IN} ≤ 30 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.0	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	90	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 19 V ≤ V_{IN} ≤ 25 V I_{OUT} = 50 mA, T_j = 25°C		50	66	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	0.7	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−1.6	—	mV/°C

TA7815F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 23 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		14.4	15.0	15.6	V
Line regulation	Reg·line	1	T_j = 25°C	17.5 V ≤ V_{IN} ≤ 30 V	—	11	300	mV
				20 V ≤ V_{IN} ≤ 26 V	—	3	150	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	12	300	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	4	150	
Output voltage	V_{OUT}	1	T_j = 25°C	17.5 V ≤ V_{IN} ≤ 30 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	14.25	—	15.75	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.4	8.0	mA
Quiescent current change	ΔI_B	1	17.5 V ≤ V_{IN} ≤ 30 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.0	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	110	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 23 V ≤ V_{IN} ≤ 28.5 V I_{OUT} = 50 mA, T_j = 25°C		49	65	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	0.5	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−2.0	—	mV/°C

TA7818F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 27 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		17.3	18.0	18.7	V
Line regulation	Reg·line	1	T_j = 25°C	21 V ≤ V_{IN} ≤ 33 V	—	13	360	mV
				24 V ≤ V_{IN} ≤ 30 V	—	4	180	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	12	360	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	4	180	
Output voltage	V_{OUT}	1	T_j = 25°C	21 V ≤ V_{IN} ≤ 33 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	17.1	—	18.9	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.5	8.0	mA
Quiescent current change	ΔI_B	1	21 V ≤ V_{IN} ≤ 33 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.0	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	125	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 27 V ≤ V_{IN} ≤ 32 V I_{OUT} = 50 mA, T_j = 25°C		47	63	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	0.4	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−2.5	—	mV/°C

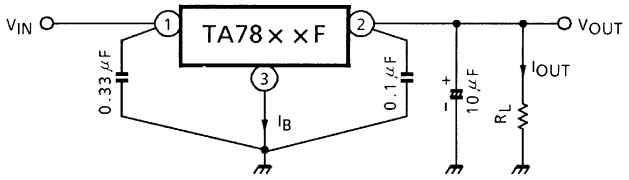
TA7820F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 29 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		19.2	20.0	20.8	V
Line regulation	Reg·line	1	T_j = 25°C	23 V ≤ V_{IN} ≤ 35 V	—	15	400	mV
				26 V ≤ V_{IN} ≤ 32 V	—	5	200	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	12	400	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	4	200	
Output voltage	V_{OUT}	1	T_j = 25°C	23 V ≤ V_{IN} ≤ 35 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	19.0	—	21.0	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.6	8.0	mA
Quiescent current change	ΔI_B	1	23 V ≤ V_{IN} ≤ 35 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.0	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	135	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 29 V ≤ V_{IN} ≤ 34 V I_{OUT} = 50 mA, T_j = 25°C		45	61	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	0.4	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−3.0	—	mV/°C

TA7824F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 33 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

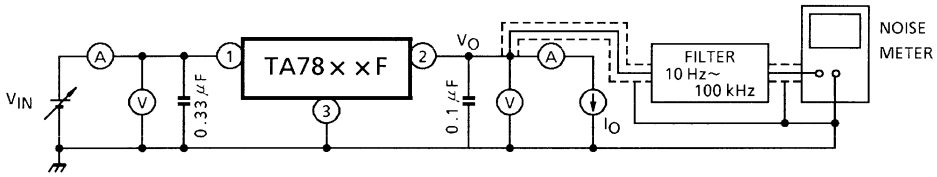
Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		23.0	24.0	25.0	V
Line regulation	Reg·line	1	T_j = 25°C	27 V ≤ V_{IN} ≤ 38 V	—	18	480	mV
				30 V ≤ V_{IN} ≤ 36 V	—	6	240	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 1.4 A	—	12	480	mV
				250 mA ≤ I_{OUT} ≤ 750 mA	—	4	240	
Output voltage	V_{OUT}	1	T_j = 25°C	27 V ≤ V_{IN} ≤ 38 V 5.0 mA ≤ I_{OUT} ≤ 1.0 A	22.8	—	25.2	V
Quiescent current	I_B	1	T_j = 25°C, I_{OUT} = 5 mA		—	4.6	8.0	mA
Quiescent current change	ΔI_B	1	27 V ≤ V_{IN} ≤ 38 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.0	mA
Output noise voltage	V_{NO}	2	Ta = 25°C, 10 Hz ≤ f ≤ 100 kHz I_{OUT} = 50 mA		—	150	—	μV_{rms}
Ripple rejection	R.R.	3	f = 120 Hz, 33 V ≤ V_{IN} ≤ 38 V I_{OUT} = 50 mA, T_j = 25°C		45	61	—	dB
Dropout voltage	V_D	1	I_{OUT} = 1.0 A, T_j = 25°C		—	2.0	—	V
Short circuit current limit	I_{SC}	1	T_j = 25°C		—	0.3	—	A
Average temperature coefficient of output voltage	T_{CVO}	1	I_{OUT} = 5 mA		—	−3.5	—	mV/°C

Test Circuit 1/Standard Application Circuit



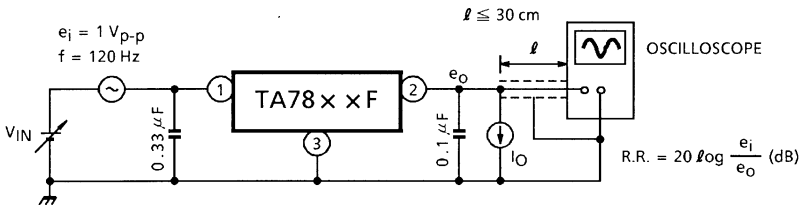
Test Circuit 2

V_{NO}

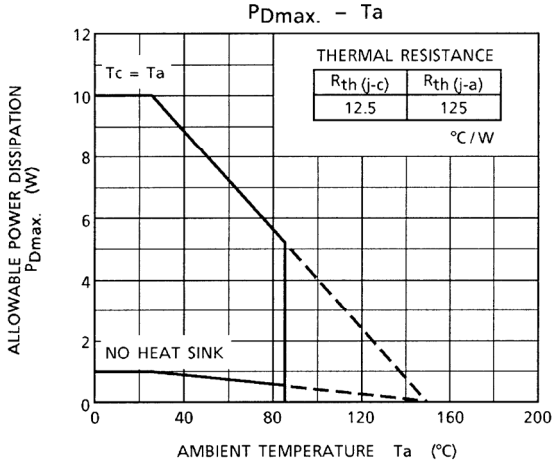


Test Circuit 3

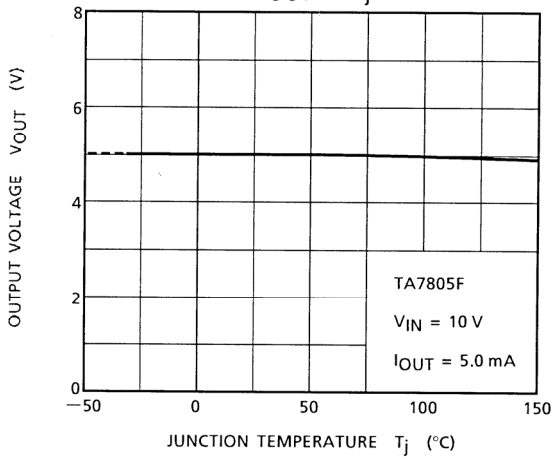
R.R.



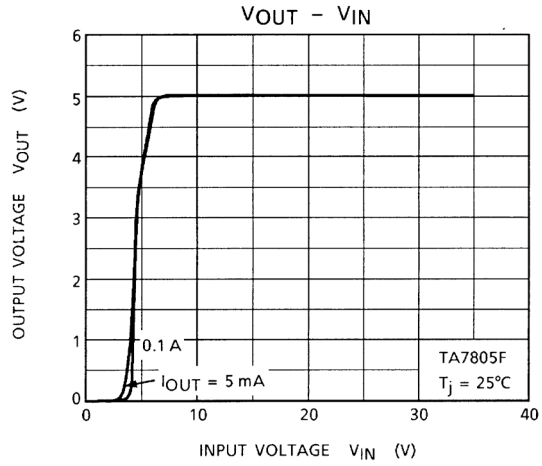
$P_{Dmax.}$ – Ta



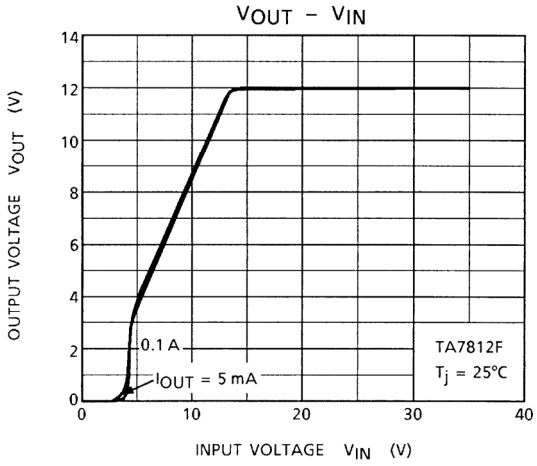
V_{OUT} – T_j



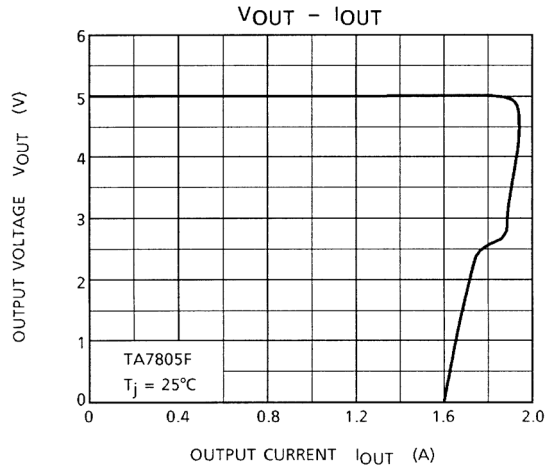
V_{OUT} – V_{IN}



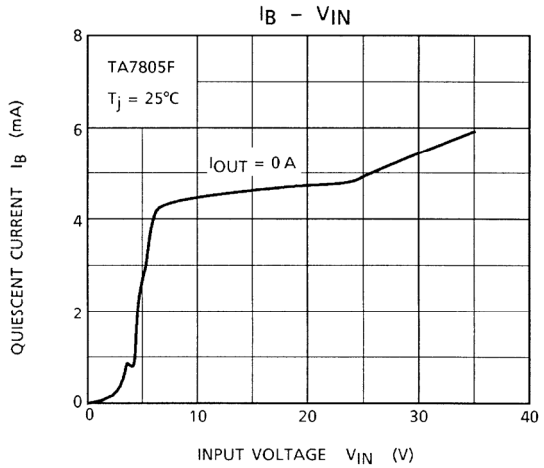
V_{OUT} – V_{IN}



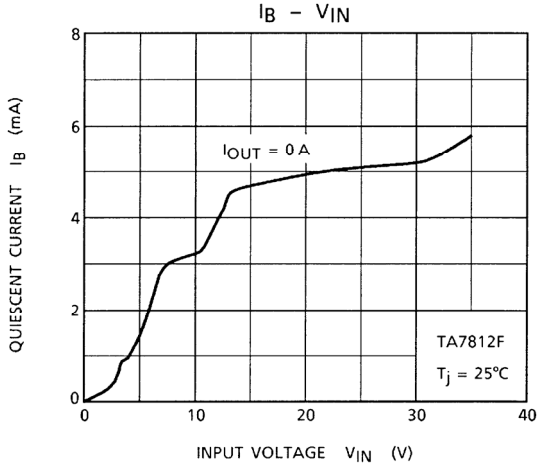
V_{OUT} – I_{OUT}



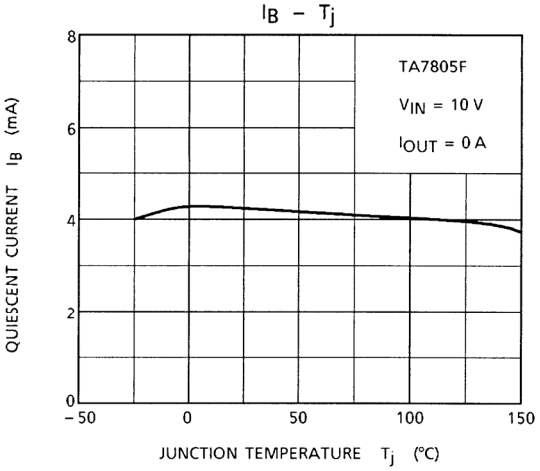
I_B – V_{IN}



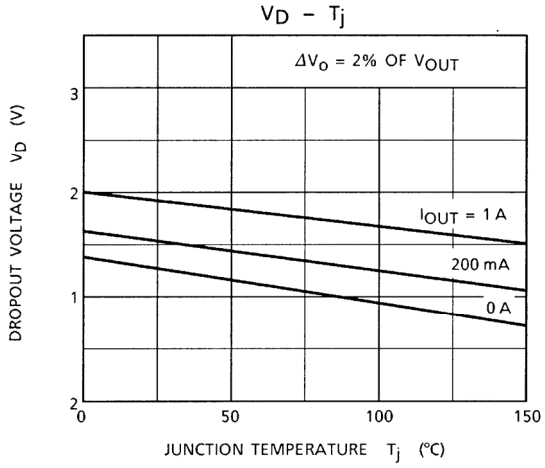
I_B – V_{IN}



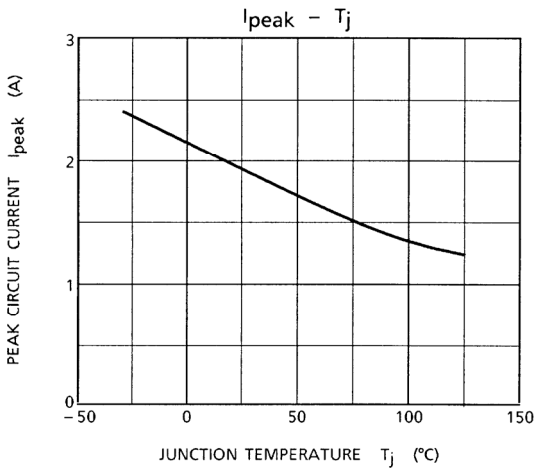
I_B – T_j



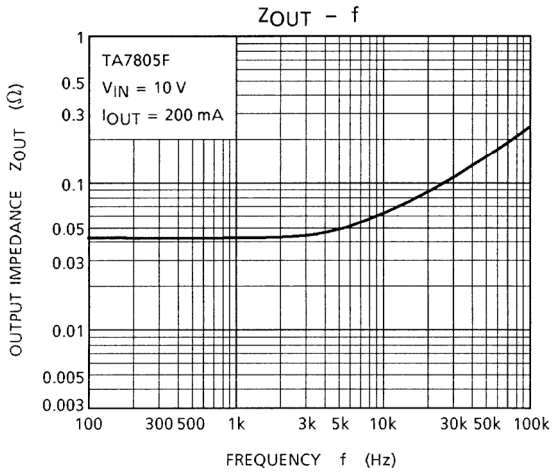
V_D – T_j



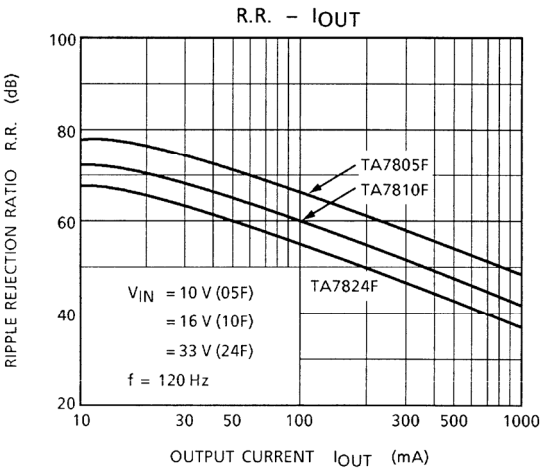
I_{peak} – T_j

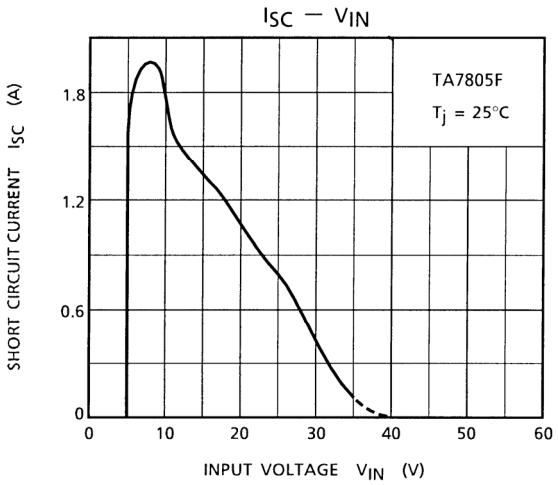


Z_{OUT} – f



R.R. – I_{OUT}




I_{SC} – V_{IN}
TA7805F
T_j = 25°C
SHORT CIRCUIT CURRENT I_{SC} (A)
1.8
1.2
0.6
0
0
10
20
30
40
50
60
INPUT VOLTAGE V_{IN} (V)

Precautions on Application

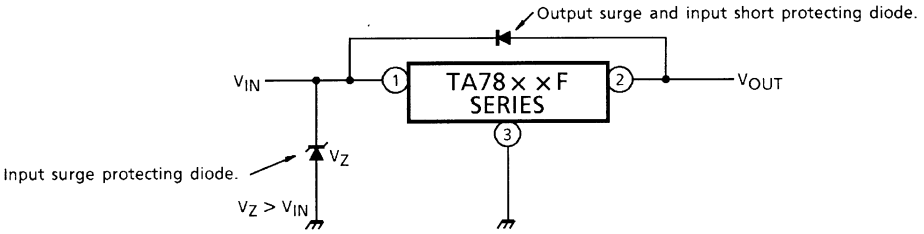
(1) In regard to GND, be careful not to apply a negative voltage to the input/output terminal. Further, special care is necessary in the case of a voltage boost application.

(2) If a surge voltage exceeding the absolute maximum rating is applied to the input terminal or if a voltage in excess of the input terminal voltage is applied to the output terminal, the circuit may be destroyed.

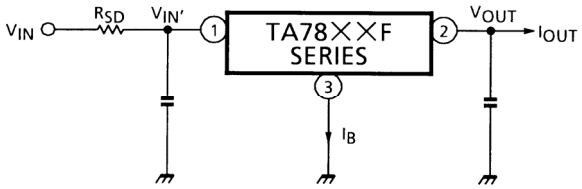
Particular care is necessary in the case of the latter.

Circuit destruction may also occur if the input terminal shorts to GND in a state of normal operation, causing the output terminal voltage to exceed the input voltage (GND potential) and the electrical charge of the chemical capacitor connected to the output terminal to flow into the input side.

Where these risks exist, take steps such as connecting zener and general silicon diodes to the circuit, as shown in the figure below.



(3) When the input voltage is too high, the power dissipation of the three-terminal regulator, which is a series regulator, increases, causing the junction temperature to rise. In such a case, it is recommended to reduce the power dissipation, and hence the junction temperature, by inserting a power-limiting resistor R_{SD} in the input terminal.



The power dissipation P_D of the IC is expressed in the following equation.

$$P_D = (V_{IN'} - V_{OUT}) \cdot I_{OUT} + V_{IN'} \cdot I_B$$

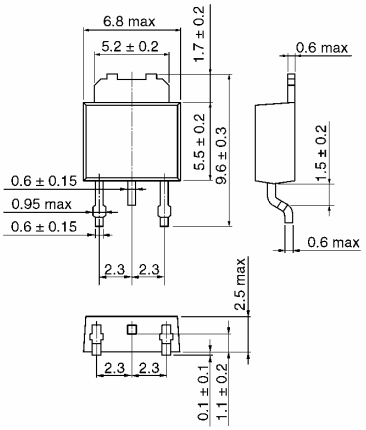
Reducing $V_{IN'}$ below the lowest voltage necessary for the IC will cause ripple, deterioration in output regulation and, in certain circumstances, parasitic oscillation.

To determine the resistance value of R_{SD}, design with a margin, referring to the following equation.

$$R_{SD} < \frac{V_{IN} - V_{IN'}}{I_{OUT} + I_B}$$

(4) Be sure to connect a capacitor near the input terminal and output terminal between both terminals and GND. The capacitances should be determined experimentally because they depend on PCB patterns. In particular, adequate investigation should be made to ensure there is no problem even in high or low temperatures.

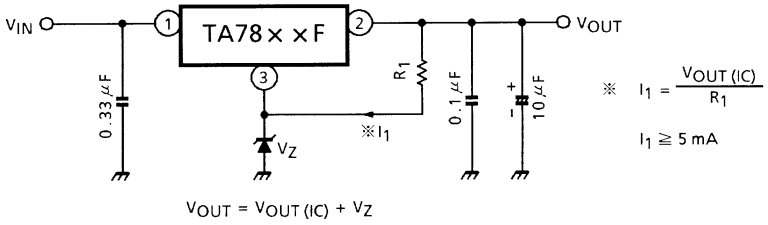
(5) The molded plastic portion of this unit, measuring 5.5 mm (L) by 6.8 mm (W) by 2.5 mm (T), is more compact compared to its equivalent TO-220.
The GND fin extends directly out of the main body, and can be soldered directly to the ceramic circuit board for significant increase in power dissipation.
To obtain high reliability in the heat sink design of the regulator IC, it is generally required to derate more than 20% of maximum junction temperature (T_j max).
Further, full consideration should be given to the installation of IC on a heat sink.



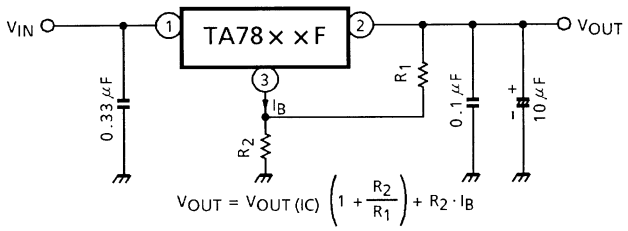
Application Circuits

(1) Voltage boost regulator

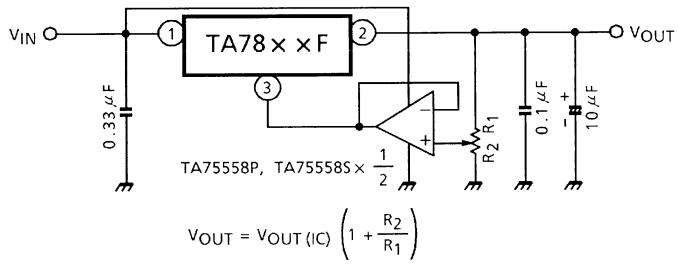
(a) Voltage boost by use of zener diode



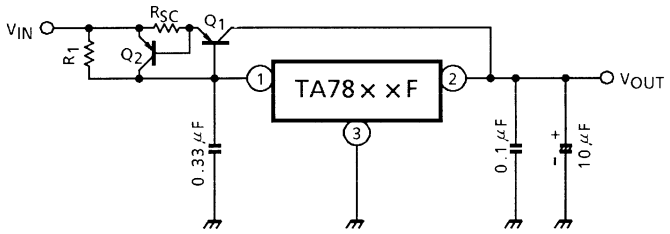
(b) Voltage boost by use of resistor



(c) Adjustable output regulator



(2) Current boost regulator



Heat sink is needed for Q_1.

$$R_1 \leqq \frac{V_{BE1}}{I_{B\ MAX}}$$

where,

V_{BE1} : V_{BE} of external transistor Q_1.
$I_{B\ MAX}$: Quiescent current of IC.

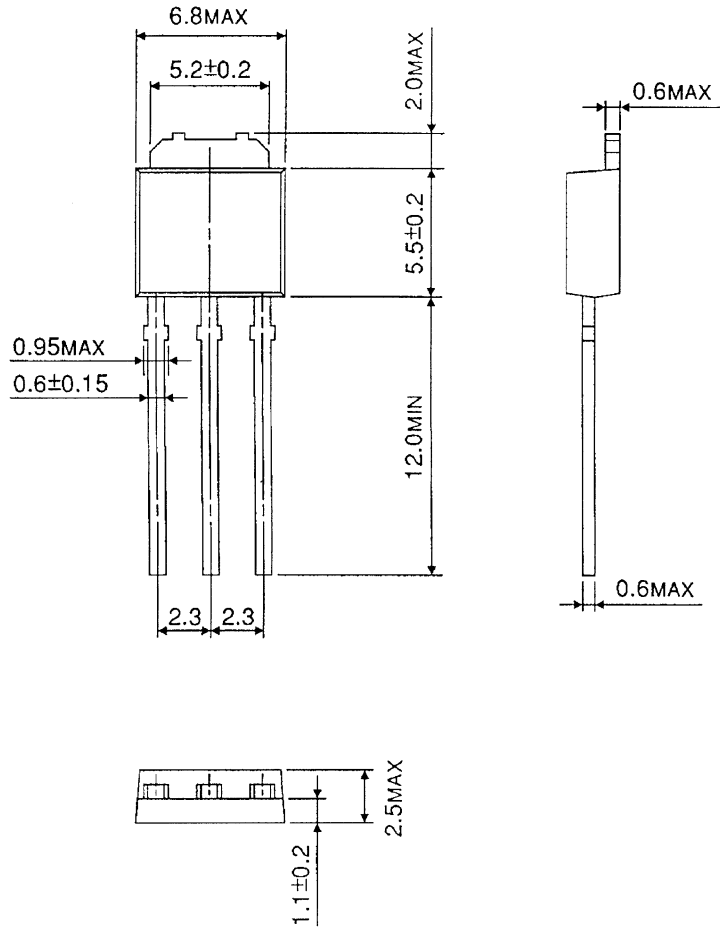
$$R_{SC} = \frac{V_{BE2}}{I_{SC}}$$

where,

I_{SC} : Short-circuit current.

Package Dimensions

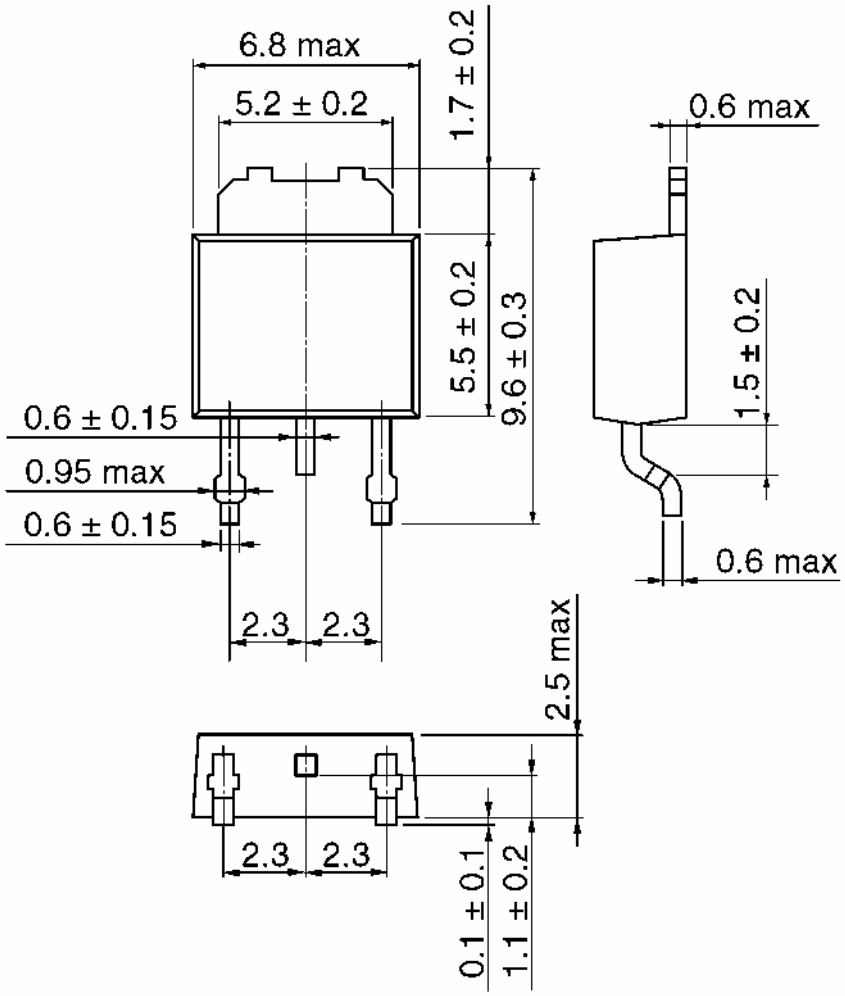
HSIP3-P-2.30B Unit : mm



Weight : 0.36 g (Typ.)

Package Dimensions

HSOP3-P-2.30A Unit: mm



Weight: 0.36 g (typ.)

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