TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

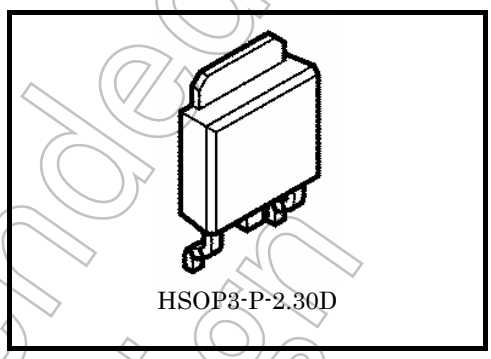
TA7805F,TA78057F,TA7806F,TA7807F,TA7808F,TA7809F TA7810F,TA7812F,TA7815F,TA7818F,TA7820F,TA7824F

Output Current of 1A, 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

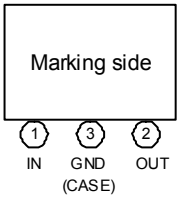
- Internal overcurrent protection.
- Internal overheating protection.
- Maximum output current of 1 A.
- Packaged in New PW-Mold (Surface-mount type).



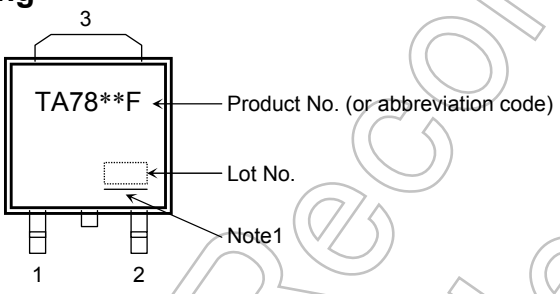
HSOP3-P-2.30D

Weight
HSOP3-P-2.30D: 0.36 g (typ.)

Pin Assignment



Marking



Note: The "**" part of each product number varies according to the output voltage of the product.

Note1: A line under a Lot No. identifies the indication of product Labels.
Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

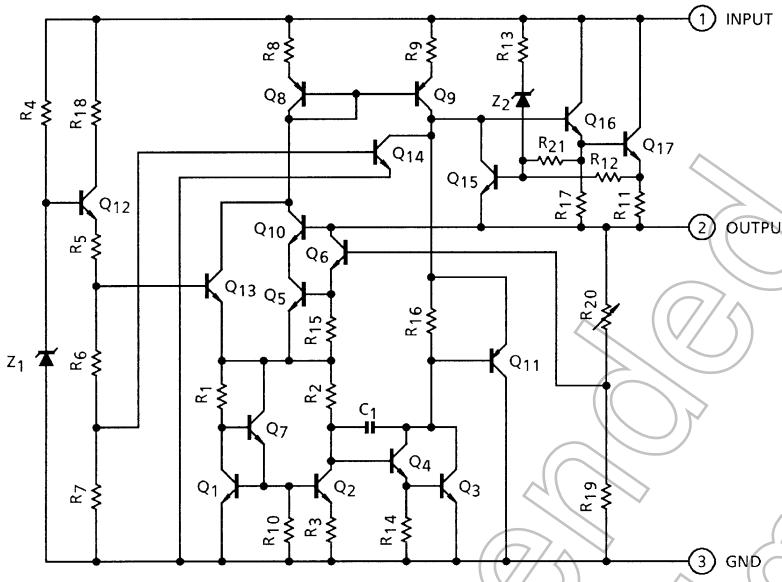
Ordering Method

Product Name	Package (Lead Type)	Packing Form
TA78**F (TE16L1, NQ)	New PW-Mold: Surface-mount	Tape (2000 pcs ./ reel)

Note: The "**" in each pro-forma product name is replaced with the output voltage of each product.

The product(s) in this document ("Product") contain functions intended to protect the Product from temporary small overloads such as minor short-term overcurrent or overheating. The protective functions do not necessarily protect Product under all circumstances. When incorporating Product into your system, please design the system (1) to avoid such overloads upon the Product, and (2) to shut down or otherwise relieve the Product of such overload conditions immediately upon occurrence. For details, please refer to the notes appearing below in this document and other documents referenced in this document.

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			
Output current		I_{OUT}	1	A
Power dissipation	(Ta = 25°C)	P_D	1	W
	(Tc = 25°C)		10	
Operating junction temperature		T_{jopr}	−30 to 150	°C
Storage temperature		T_{stg}	−55 to 150	°C
Junction temperature		T_j	150	°C
Thermal resistance		$R_{th\ (j-c)}$	12.5	°C/W
		$R_{th\ (j-a)}$	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_{BI}	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	Tj = 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_{BI}	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	Tj = 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
				9.0 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_{BI}	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	Tj = 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	9.0 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	9.0 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_{BI}	1	9.0 V ≤ V_{IN} ≤ 25 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.3	mA
Output noise voltage	V_{NO}	2	Tj = 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_{BI}	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	Tj = 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_{BI}	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	Tj = 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_{BI}	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	Tj = 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_{BI}	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	Tj = 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_{BI}	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	Tj = 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_{BI}	1	21 V ≤ V_{IN} ≤ 33 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.0	mA
Output noise voltage	V_{NO}	2	Tj = 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

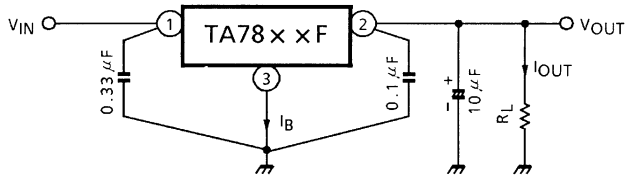
TA7820F
Electrical Characteristics
(Unless otherwise specified, V_{IN} = 29 V, I_{OUT} = 500 mA, 0°C ≤ T_j ≤ 125°C)

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_{BI}	1	23 V ≤ V_{IN} ≤ 35 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.0	mA
Output noise voltage	V_{NO}	2	Tj = 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)

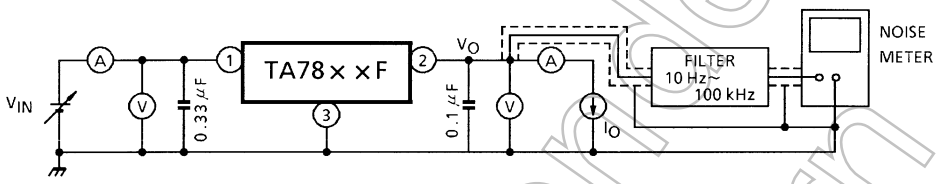
Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Output voltage	V_{OUT}	1	T_j = 25°C, I_{OUT} = 100 mA		23.0	24.0	25.0	V
Line regulation	Reg·line	1	T_j = 25°C	27 V ≤ V_{IN} ≤ 38 V	—	18	480	mV
				30 V ≤ V_{IN} ≤ 36 V	—	6	240	
Load regulation	Reg·load	1	T_j = 25°C	5 mA ≤ I_{OUT} ≤ 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_{BI}	1	27 V ≤ V_{IN} ≤ 38 V, I_{OUT} = 5 mA, T_j = 25°C		—	—	1.0	mA
Output noise voltage	V_{NO}	2	Tj = 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



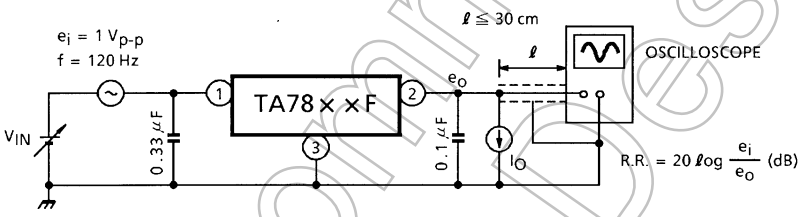
Test Circuit 2

V_{NO}

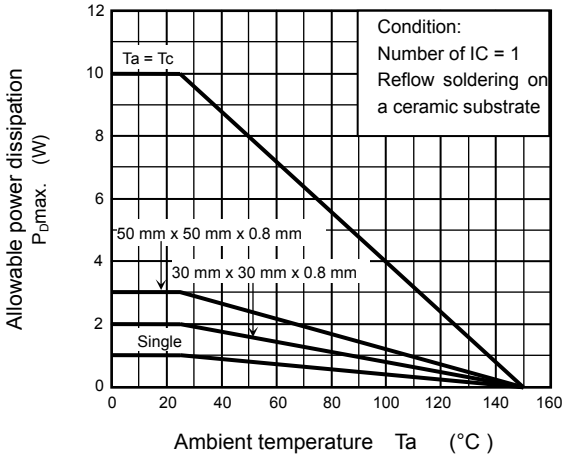


Test Circuit 3

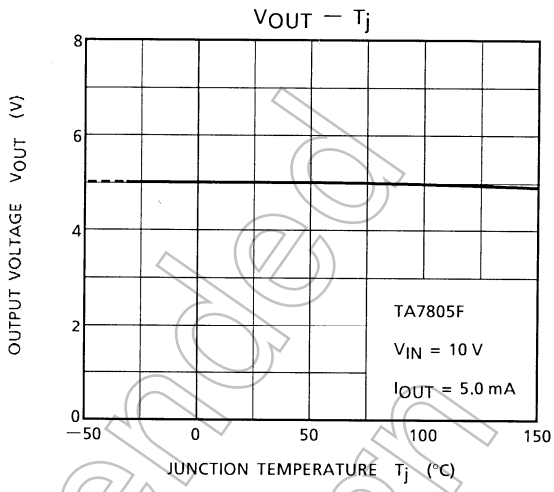
R.R.



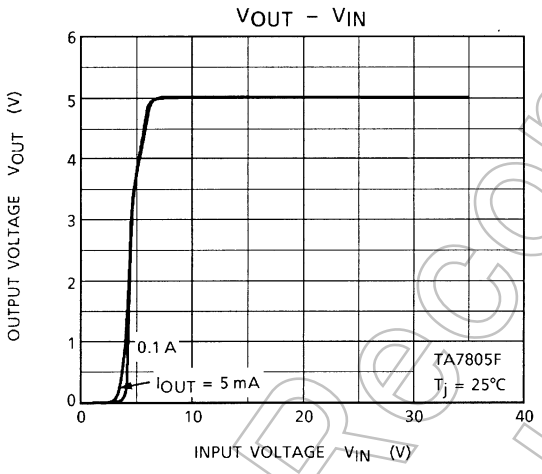
$P_D$max. – Ta



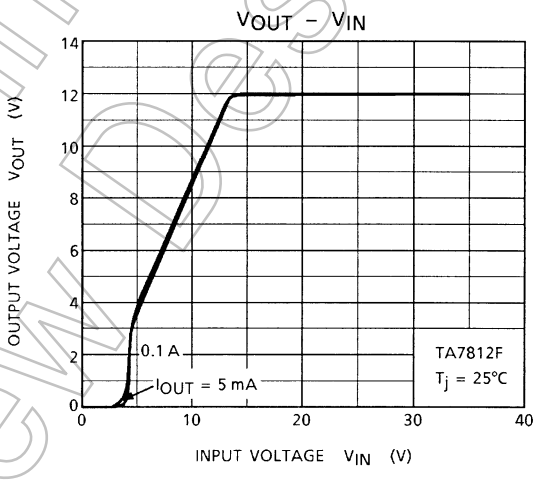
V_{OUT} – T_j



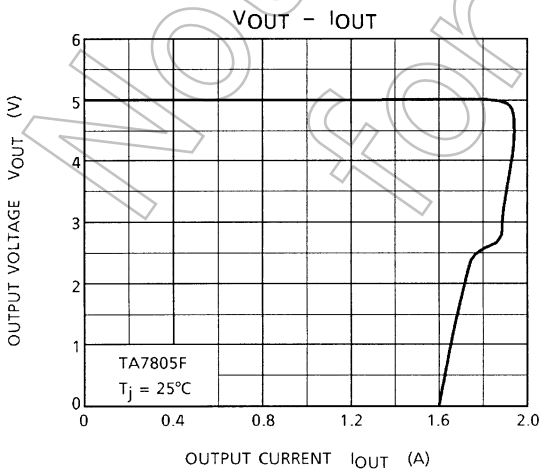
V_{OUT} – V_{IN}



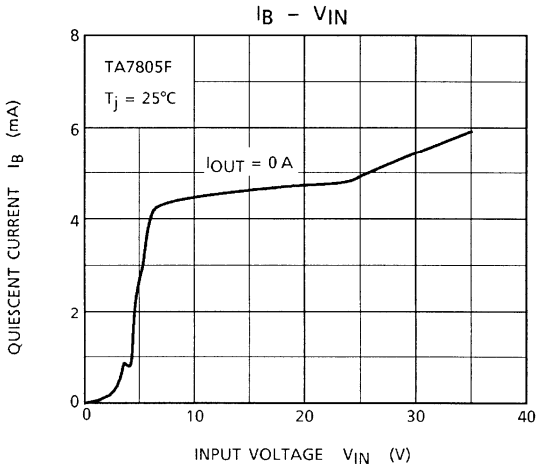
V_{OUT} – V_{IN}



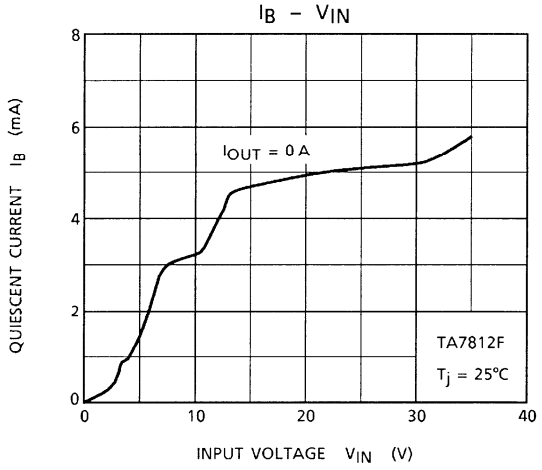
V_{OUT} – I_{OUT}



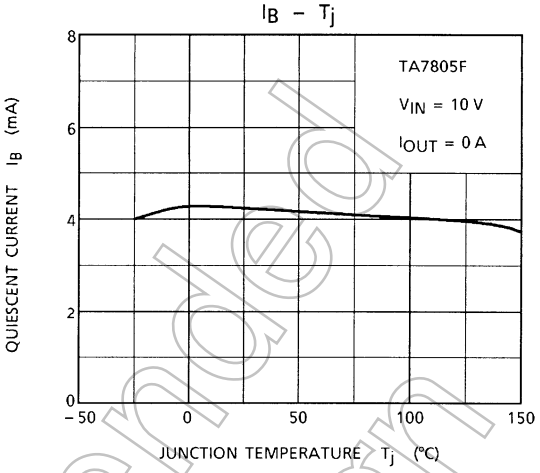
I_B – V_{IN}



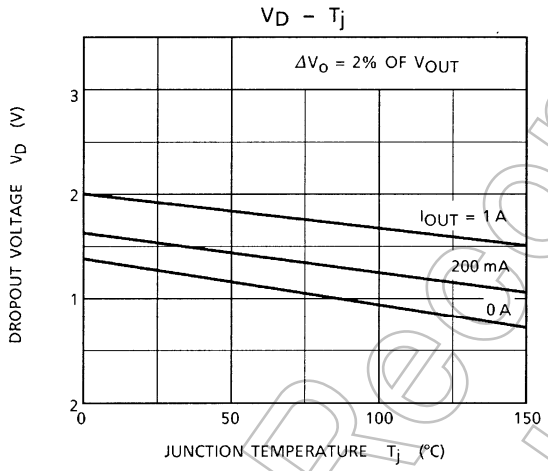
I_B – V_{IN}



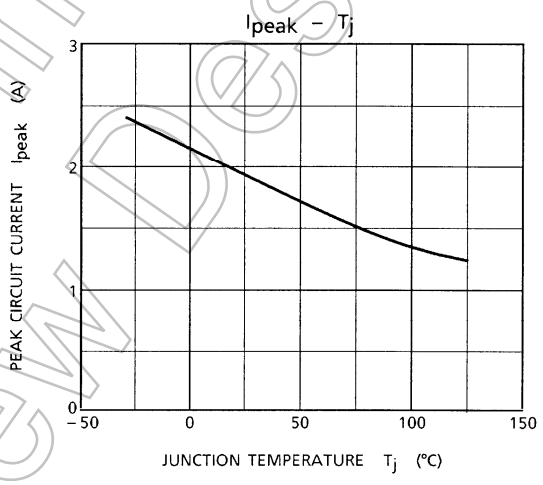
I_B – T_j



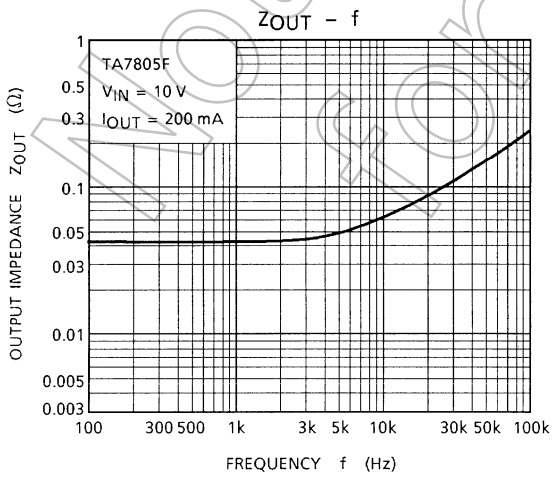
V_D – T_j



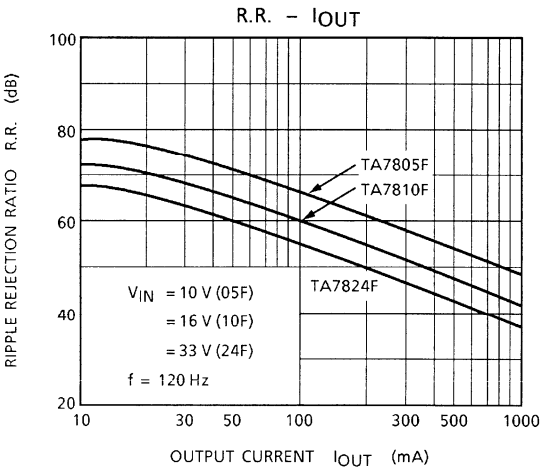
I_{peak} – T_j

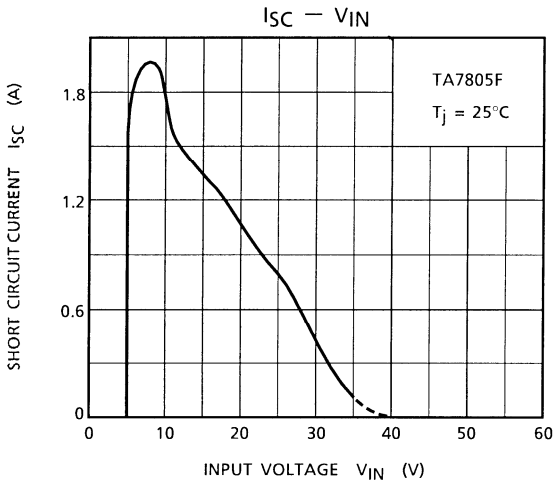


Z_{OUT} – f



R.R. – I_{OUT}

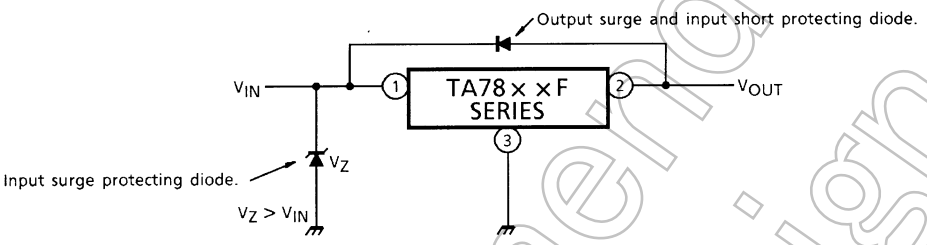




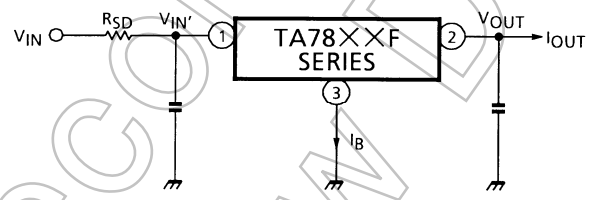
Usage Precautions

(1) In regard to GND, be careful not to apply a negative voltage to the input/output terminal.

(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 6.5 mm (W) by 2.3 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.

- Low voltage

  Do not apply voltage to the Product that is lower than the minimum operating voltage, or the Product's protective functions will not operate properly and the Product may be permanently damaged.

- Overcurrent Protection

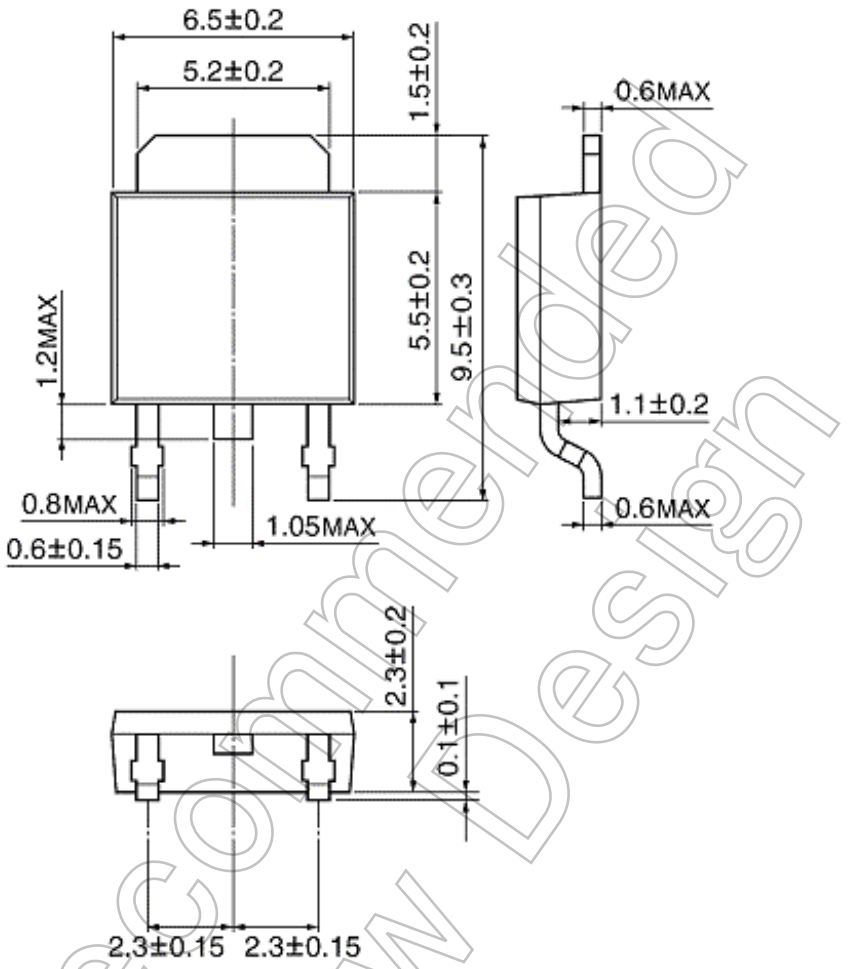
  The overcurrent protection circuits in the Product are designed to temporarily protect Product from minor overcurrent of brief duration. When the overcurrent protective function in the Product activates, immediately cease application of overcurrent to Product. Improper usage of Product, such as application of current to Product exceeding the absolute maximum ratings, could cause the overcurrent protection circuit not to operate properly and/or damage Product permanently even before the protection circuit starts to operate.

- Overheating Protection

  The thermal shutdown circuits in the Product are designed to temporarily protect Product from minor overheating of brief duration. When the overheating protective function in the Product activates, immediately correct the overheating situation. Improper usage of Product, such as the application of heat to Product exceeding the absolute maximum ratings, could cause the overheating protection circuit not to operate properly and/or damage Product permanently even before the protection circuit starts to operate.

Package Dimensions

HSOP3-P-2.30D Unit: mm



Weight: 0.36 g (typ.)

RESTRICTIONS ON PRODUCT USE

- Toshiba Corporation, and its subsidiaries and affiliates (collectively “TOSHIBA”), reserve the right to make changes to the information in this document, and related hardware, software and systems (collectively “Product”) without notice.
- This document and any information herein may not be reproduced without prior written permission from TOSHIBA. Even with TOSHIBA’s written permission, reproduction is permissible only if reproduction is without alteration/omission.
- Though TOSHIBA works continually to improve Product’s quality and reliability, Product can malfunction or fail. Customers are responsible for complying with safety standards and for providing adequate designs and safeguards for their hardware, software and systems which minimize risk and avoid situations in which a malfunction or failure of Product could cause loss of human life, bodily injury or damage to property, including data loss or corruption. Before creating and producing designs and using, customers must also refer to and comply with (a) the latest versions of all relevant TOSHIBA information, including without limitation, this document, the specifications, the data sheets and application notes for Product and the precautions and conditions set forth in the “TOSHIBA Semiconductor Reliability Handbook” and (b) the instructions for the application that Product will be used with or for. Customers are solely responsible for all aspects of their own product design or applications, including but not limited to (a) determining the appropriateness of the use of this Product in such design or applications; (b) evaluating and determining the applicability of any information contained in this document, or in charts, diagrams, programs, algorithms, sample application circuits, or any other referenced documents; and (c) validating all operating parameters for such designs and applications. **TOSHIBA ASSUMES NO LIABILITY FOR CUSTOMERS’ PRODUCT DESIGN OR APPLICATIONS.**
- Product is intended for use in general electronics applications (e.g., computers, personal equipment, office equipment, measuring equipment, industrial robots and home electronics appliances) or for specific applications as expressly stated in this document. Product is neither intended nor warranted for use in equipment or systems that require extraordinarily high levels of quality and/or reliability and/or a malfunction or failure of which may cause loss of human life, bodily injury, serious property damage or serious public impact (“Unintended Use”). Unintended Use includes, without limitation, equipment used in nuclear facilities, equipment used in the aerospace industry, medical equipment, equipment used for automobiles, trains, ships and other transportation, traffic signaling equipment, equipment used to control combustions or explosions, safety devices, elevators and escalators, devices related to electric power, and equipment used in finance-related fields. Do not use Product for Unintended Use unless specifically permitted in this document.
- Do not disassemble, analyze, reverse-engineer, alter, modify, translate or copy Product, whether in whole or in part.
- Product shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable laws or regulations.
- The information contained herein is presented only as guidance for Product use. No responsibility is assumed by TOSHIBA for any infringement of patents or any other intellectual property rights of third parties that may result from the use of Product. No license to any intellectual property right is granted by this document, whether express or implied, by estoppel or otherwise.
- **ABSENT A WRITTEN SIGNED AGREEMENT, EXCEPT AS PROVIDED IN THE RELEVANT TERMS AND CONDITIONS OF SALE FOR PRODUCT, AND TO THE MAXIMUM EXTENT ALLOWABLE BY LAW, TOSHIBA (1) ASSUMES NO LIABILITY WHATSOEVER, INCLUDING WITHOUT LIMITATION, INDIRECT, CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OR LOSS, INCLUDING WITHOUT LIMITATION, LOSS OF PROFITS, LOSS OF OPPORTUNITIES, BUSINESS INTERRUPTION AND LOSS OF DATA, AND (2) DISCLAIMS ANY AND ALL EXPRESS OR IMPLIED WARRANTIES AND CONDITIONS RELATED TO SALE, USE OF PRODUCT, OR INFORMATION, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, ACCURACY OF INFORMATION, OR NONINFRINGEMENT.**
- Do not use or otherwise make available Product or related software or technology for any military purposes, including without limitation, for the design, development, use, stockpiling or manufacturing of nuclear, chemical, or biological weapons or missile technology products (mass destruction weapons). Product and related software and technology may be controlled under the Japanese Foreign Exchange and Foreign Trade Law and the U.S. Export Administration Regulations. Export and re-export of Product or related software or technology are strictly prohibited except in compliance with all applicable export laws and regulations.
- Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. Please use Product in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. TOSHIBA assumes no liability for damages or losses occurring as a result of noncompliance with applicable laws and regulations.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Toshiba:

TA7812F(TE16L,Q) TA7815F(TE16L1,NQ) TA7812F(TE16L1,NQ)