

3-Terminal 1A Positive Voltage Regulator

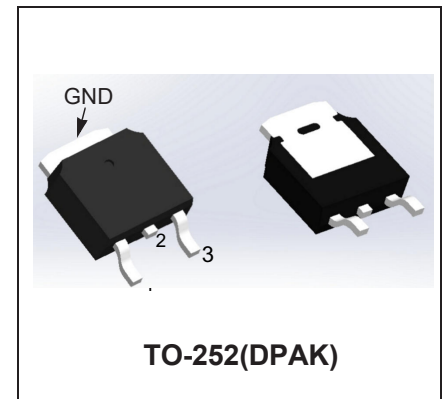
Description

The LRC LR78XXD family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current up to 1 A.

Features

- Output current up to 1A
- Fixed output voltage of 5V, 6V, 7V, 8V,9V,10V, 12V, 15V ,18V and 24V available
- Thermal overload shutdown protection
- Short circuit current limiting
- We declare that the material of product complies with RoHS requirements.

LR78XXD



1. Input 2. GND 3. Output

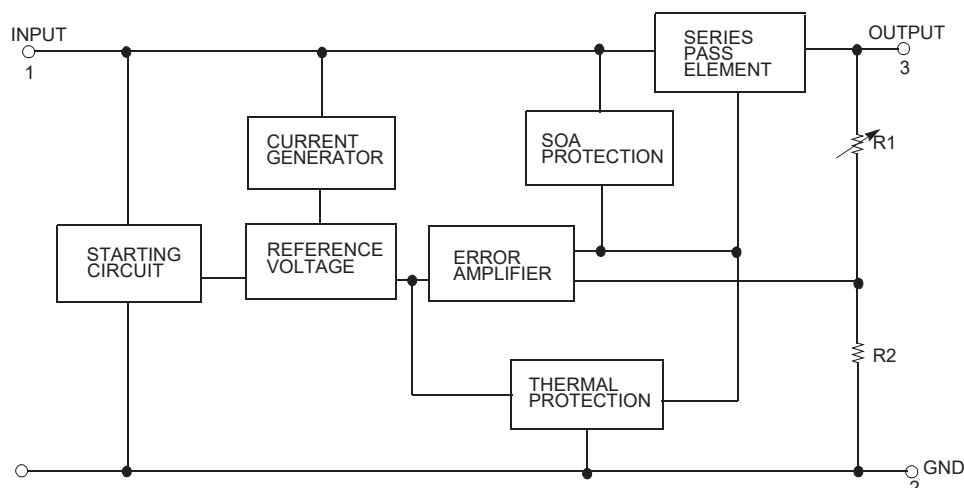
ORDERING INFORMATION

DEVICE	Package	XX Description	Packing Information	
LR78XXD	TO-252 (DPAK)	Output Voltage e.g. 12.0V=12 5.0V=05	2500 Units/ Reel	5000

DEVICE MARKING INFORMATION

Marking	First Column Description (e.g L7805D)	Second Column Description (YYWW)
	Device Code L7805D is the Device Code for LR7805D	Year and Week Code e.g. "1936" represent "The 36th week of 2019"

BLOCK DIGRAM



Absolute Maximum Ratings (Ta=25°C unless otherwise specified.)

Parameter	Symbol	Value	Unit
Input Voltage (for V _O = 5V to 18V)	V _I	35	V
(for V _O = 24V)	V _I	40	V
Thermal Resistance Junction-Case (Note1) TO-252(DAPK) (T _c = +25°C)	R _{θJC}	3.5	°C/W
Thermal Resistance Junction-Air (Note1, 2) TO-252(DAPK) (T _a = +25°C)	R _{θJA}	90	°C/W
Operating Junction Temperature Range	T _j	0 ~ +150	°C
Operating Ambient Temperature	T _{OPR}	-40 ~ +125	°C
Storage Temperature Range	T _{STG}	-55 ~ +150	°C

Note: 1. Thermal resistance test board size: 30.0mm×25.0mm×1.6mm (FR4); Copper foil: 35um; Standard soldering pad.
2. Assume no ambient airflow

Electrical Characteristics (LR7805D)

(I_{OUT} = 0.5A, V_{IN} = 10V, T_j = 0°C ~ 125°C, C_I = 0.33μF, C_O = 0.1μF, unless otherwise specified.)

Parameters	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V _O	T _J = +25°C	4.8	5	5.2	V
		I _O = 5mA to 1.0A, P _O < 15W V _I = 8V to 20V	4.75	5	5.25	
Line Regulation (Note3)	ΔV _O	T _J = 25°C, V _I = 7.5V to 20V	-	4	100	mV
		T _J = 25°C, V _I = 8V to 12V	-	2	50	
Load Regulation (Note3)	ΔV _O	T _J = 25°C, I _O = 5mA to 1.0A	-	9	100	mV
		T _J = 25°C, I _O = 250mA to 750mA	-	4	50	
Quiescent Current	I _Q	T _J = 25°C	-	4.2	8	mA
Quiescent Current Change	ΔI _Q	I _O = 5mA to 1.0A	-	-	0.5	mA
		I _O = 500mA V _I = 8V to 25V	-	-	0.8	
Output Voltage Drift	ΔV/ΔT	I _O = 5mA	-	0.8	-	mV/°C
Output Noise Voltage	V _N	f = 10Hz to 100kHz	-	42	-	μV/V _O
Ripple Rejection	RR	f = 120Hz, V _I = 8V to 18V	62	73	-	dB
Dropout Voltage	V _D	T _J = 25°C, I _O = 1.0A	-	2	-	V
Output Resistance	R _O	f = 1KHz	-	15	-	mΩ
Short Circuit Current	I _{SC}	T _J = 25°C, V _I = 35V	-	200	-	mA

Electrical Characteristics (LR7806D)

($I_{OUT} = 0.5A$, $V_{IN} = 11V$, $T_J = 0^{\circ}C \sim 125^{\circ}C$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, unless otherwise specified.)

Parameters	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}C$	5.75	6	6.25	V
		$I_O = 5mA$ to $1.0A$, $P_o < 15W$ $V_I = 9V$ to $21V$	5.65	6	6.25	
Line Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $V_I = 8.5V$ to $25V$	-	-	120	mV
		$T_J = 25^{\circ}C$, $V_I = 9V$ to $13V$	-	-	60	
Load Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $I_O = 5mA$ to $1.0A$	-	-	120	mV
		$T_J = 25^{\circ}C$, $I_O = 250mA$ to $750mA$	-	-	60	
Quiescent Current	I_Q	$T_J = 25^{\circ}C$	-	4.3	8	mA
Quiescent Current Change	ΔI_Q	$I_O = 5mA$ to $1.0A$	-	-	0.5	mA
		$I_O = 500mA$ $V_I = 9V$ to $25V$	-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_O = 5mA$	-	0.8	-	mV/ $^{\circ}C$
Output Noise Voltage	V_N	$f = 10Hz$ to $100kHz$	-	42	-	$\mu V/V_O$
Ripple Rejection	RR	$f = 120Hz$, $V_I = 9V$ to $19V$	-	68	-	dB
Dropout Voltage	V_D	$T_J = 25^{\circ}C$, $I_O = 1.0A$	-	2	-	V
Output Resistance	R_O	$f = 1KHz$	-	17	-	m Ω
Short Circuit Current	ISC	$T_J = 25^{\circ}C$, $V_I = 35V$	-	200	-	mA

Electrical Characteristics (LR7808D)

($I_{OUT} = 0.5A$, $V_{IN} = 14V$, $T_J = 0^{\circ}C \sim 125^{\circ}C$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, unless otherwise specified.)

Parameters	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}C$	7.84	8	8.16	V
		$I_O = 5mA$ to $1.0A$, $P_o < 15W$ $V_I = 11.5V$ to $23V$	7.7	8	8.3	
Line Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $V_I = 10.5V$ to $25V$	-	-	160	mV
		$T_J = 25^{\circ}C$, $V_I = 11V$ to $17V$	-	-	80	
Load Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $I_O = 5mA$ to $1.0A$	-	-	160	mV
		$T_J = 25^{\circ}C$, $I_O = 250mA$ to $750mA$	-	-	80	
Quiescent Current	I_Q	$T_J = 25^{\circ}C$	-	4.3	8	mA
Quiescent Current Change	ΔI_Q	$I_O = 5mA$ to $1.0A$	-	-	0.5	mA
		$I_O = 500mA$ $V_I = 11.5V$ to $25V$	-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_O = 5mA$	-	1.0	-	mV/ $^{\circ}C$
Output Noise Voltage	V_N	$f = 10Hz$ to $100kHz$	-	42	-	$\mu V/V_O$
Ripple Rejection	RR	$f = 120Hz$, $V_I = 11.5V$ to $21.5V$	-	62	-	dB
Dropout Voltage	V_D	$T_J = 25^{\circ}C$, $I_O = 1.0A$	-	2	-	V
Output Resistance	R_O	$f = 1KHz$	-	18	-	m Ω
Short Circuit Current	ISC	$T_J = 25^{\circ}C$, $V_I = 35V$	-	200	-	mA

Electrical Characteristics (LR7809D)

($I_{OUT} = 0.5A$, $V_{IN} = 15V$, $T_J = 0^{\circ}C \sim 125^{\circ}C$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, unless otherwise specified.)

Parameters	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}C$	8.82	9	9.18	V
		$I_O = 5mA$ to $1.0A$, $P_o < 15W$ $V_I = 12.5V$ to $24V$	8.65	9	9.35	
Line Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $V_I = 11.5V$ to $26V$	-	-	180	mV
		$T_J = 25^{\circ}C$, $V_I = 12V$ to $18V$	-	-	90	
Load Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $I_O = 5mA$ to $1.0A$	-	-	190	mV
		$T_J = 25^{\circ}C$, $I_O = 250mA$ to $750mA$	-	-	80	
Quiescent Current	I_Q	$T_J = 25^{\circ}C$	-	4.3	8	mA
Quiescent Current Change	ΔI_Q	$I_O = 5mA$ to $1.0A$	-	-	0.5	mA
		$I_O = 500mA$ $V_I = 12.5V$ to $25V$	-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_O = 5mA$	-	1.2	-	mV/ $^{\circ}C$
Output Noise Voltage	V_N	$f = 10Hz$ to $100kHz$	-	42	-	$\mu V/V_O$
Ripple Rejection	RR	$f = 120Hz$, $V_I = 12.5V$ to $22.5V$	-	61	-	dB
Dropout Voltage	V_D	$T_J = 25^{\circ}C$, $I_O = 1.0A$	-	2	-	V
Output Resistance	R_O	$f = 1KHz$	-	18	-	m Ω
Short Circuit Current	ISC	$T_J = 25^{\circ}C$, $V_I = 35V$	-	200	-	mA

Electrical Characteristics (LR7810D)

($I_{OUT} = 0.5A$, $V_{IN} = 16V$, $T_J = 0^{\circ}C \sim 125^{\circ}C$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, unless otherwise specified.)

Parameters	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}C$	9.7	10	10.3	V
		$I_O = 5mA$ to $1.0A$, $P_o < 15W$ $V_I = 11.5V$ to $23V$	9.6	10	10.4	
Line Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $V_I = 10.5V$ to $25V$	-	8	200	mV
		$T_J = 25^{\circ}C$, $V_I = 11V$ to $17V$	-	4	100	
Load Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $I_O = 5mA$ to $1.0A$	-	18	200	mV
		$T_J = 25^{\circ}C$, $I_O = 250mA$ to $750mA$	-	8	100	
Quiescent Current	I_Q	$T_J = 25^{\circ}C$	-	4.3	8	mA
Quiescent Current Change	ΔI_Q	$I_O = 5mA$ to $1.0A$	-	-	0.5	mA
		$I_O = 500mA$ $V_I = 11.5V$ to $25V$	-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_O = 5mA$	-	1.3	-	mV/ $^{\circ}C$
Output Noise Voltage	V_N	$f = 10Hz$ to $100kHz$	-	42	-	$\mu V/V_O$
Ripple Rejection	RR	$f = 120Hz$, $V_I = 11.5V$ to $21.5V$	-	61	-	dB
Dropout Voltage	V_D	$T_J = 25^{\circ}C$, $I_O = 1.0A$	-	2	-	V
Output Resistance	R_O	$f = 1KHz$	-	18	-	m Ω
Short Circuit Current	ISC	$T_J = 25^{\circ}C$, $V_I = 35V$	-	200	-	mA

Electrical Characteristics (LR7812D)

($I_{OUT} = 0.5A$, $V_{IN} = 19V$, $T_J = 0^{\circ}C \sim 125^{\circ}C$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, unless otherwise specified.)

Parameters	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}C$	11.5	12	12.5	V
		$I_O = 5mA$ to $1.0A$, $P_o < 15W$ $V_I = 15.5V$ to $27V$	11.4	12	12.6	
Line Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $V_I = 14.5V$ to $30V$	-	-	240	mV
		$T_J = 25^{\circ}C$, $V_I = 16V$ to $22V$	-	-	120	
Load Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $I_O = 5mA$ to $1.0A$	-	-	240	mV
		$T_J = 25^{\circ}C$, $I_O = 250mA$ to $750mA$	-	-	120	
Quiescent Current	I_Q	$T_J = 25^{\circ}C$	-	4.4	8	mA
Quiescent Current Change	ΔI_Q	$I_O = 5mA$ to $1.0A$	-	-	0.5	mA
		$I_O = 500mA$ $V_I = 15V$ to $30V$	-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_O = 5mA$	-	1.5	-	mV/ $^{\circ}C$
Output Noise Voltage	V_N	$f = 10Hz$ to $100kHz$	-	42	-	$\mu V/V_O$
Ripple Rejection	RR	$f = 120Hz$, $V_I = 15V$ to $25V$	-	60	-	dB
Dropout Voltage	V_D	$T_J = 25^{\circ}C$, $I_O = 1.0A$	-	2	-	V
Output Resistance	R_O	$f = 1KHz$	-	18	-	m Ω
Short Circuit Current	ISC	$T_J = 25^{\circ}C$, $V_I = 35V$	-	200	-	mA

Electrical Characteristics (LR7815D)

($I_{OUT} = 0.5A$, $V_{IN} = 23V$, $T_J = 0^{\circ}C \sim 125^{\circ}C$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, unless otherwise specified.)

Parameters	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}C$	14.4	15	15.6	V
		$I_O = 5mA$ to $1.0A$, $P_o < 15W$ $V_I = 17.5V$ to $30V$	14.25	15	15.75	
Line Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $V_I = 17.5V$ to $30V$	-	15	300	mV
		$T_J = 25^{\circ}C$, $V_I = 20V$ to $26V$	-	7	150	
Load Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $I_O = 5mA$ to $1.0A$	-	25	300	mV
		$T_J = 25^{\circ}C$, $I_O = 250mA$ to $750mA$	-	10	150	
Quiescent Current	I_Q	$T_J = 25^{\circ}C$	-	5	8	mA
Quiescent Current Change	ΔI_Q	$I_O = 5mA$ to $1.0A$	-	-	0.5	mA
		$I_O = 500mA$ $V_I = 18V$ to $30V$	-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_O = 5mA$	-	1.8	-	mV/ $^{\circ}C$
Output Noise Voltage	V_N	$f = 10Hz$ to $100kHz$	-	42	-	$\mu V/V_O$
Ripple Rejection	RR	$f = 120Hz$, $V_I = 18V$ to $28V$	-	60	-	dB
Dropout Voltage	V_D	$T_J = 25^{\circ}C$, $I_O = 1.0A$	-	2	-	V
Output Resistance	R_O	$f = 1KHz$	-	18	-	m Ω
Short Circuit Current	ISC	$T_J = 25^{\circ}C$, $V_I = 35V$	-	200	-	mA

Electrical Characteristics (LR7818D)

($I_{OUT} = 0.5A$, $V_{IN} = 27V$, $T_J = 0^{\circ}C \sim 125^{\circ}C$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, unless otherwise specified.)

Parameters	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}C$	17.3	18	18.7	V
		$I_O = 5mA$ to $1.0A$, $P_o < 15W$ $V_I = 17.5V$ to $33V$	17.1	18	18.9	
Line Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $V_I = 21V$ to $33V$	-	-	360	mV
		$T_J = 25^{\circ}C$, $V_I = 24V$ to $30V$	-	-	180	
Load Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $I_O = 5mA$ to $1.0A$	-	-	360	mV
		$T_J = 25^{\circ}C$, $I_O = 250mA$ to $750mA$	-	-	180	
Quiescent Current	I_Q	$T_J = 25^{\circ}C$	-	5	8	mA
Quiescent Current Change	ΔI_Q	$I_O = 5mA$ to $1.0A$	-	-	0.5	mA
		$I_O = 500mA$ $V_I = 21V$ to $33V$	-	-	0.8	
Output Voltage Drift	$\Delta V/\Delta T$	$I_O = 5mA$	-	2.1	-	mV/ $^{\circ}C$
Output Noise Voltage	V_N	$f = 10Hz$ to $100kHz$	-	42	-	$\mu V/V_O$
Ripple Rejection	RR	$f = 120Hz$, $V_I = 22V$ to $32V$	-	57	-	dB
Dropout Voltage	V_D	$T_J = 25^{\circ}C$, $I_O = 1.0A$	-	2	-	V
Output Resistance	R_O	$f = 1KHz$	-	18	-	m Ω
Short Circuit Current	ISC	$T_J = 25^{\circ}C$, $V_I = 35V$	-	200	-	mA

Electrical Characteristics (LR7824D)

($I_{OUT} = 0.5A$, $V_{IN} = 33V$, $T_J = 0^{\circ}C \sim 125^{\circ}C$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, unless otherwise specified.)

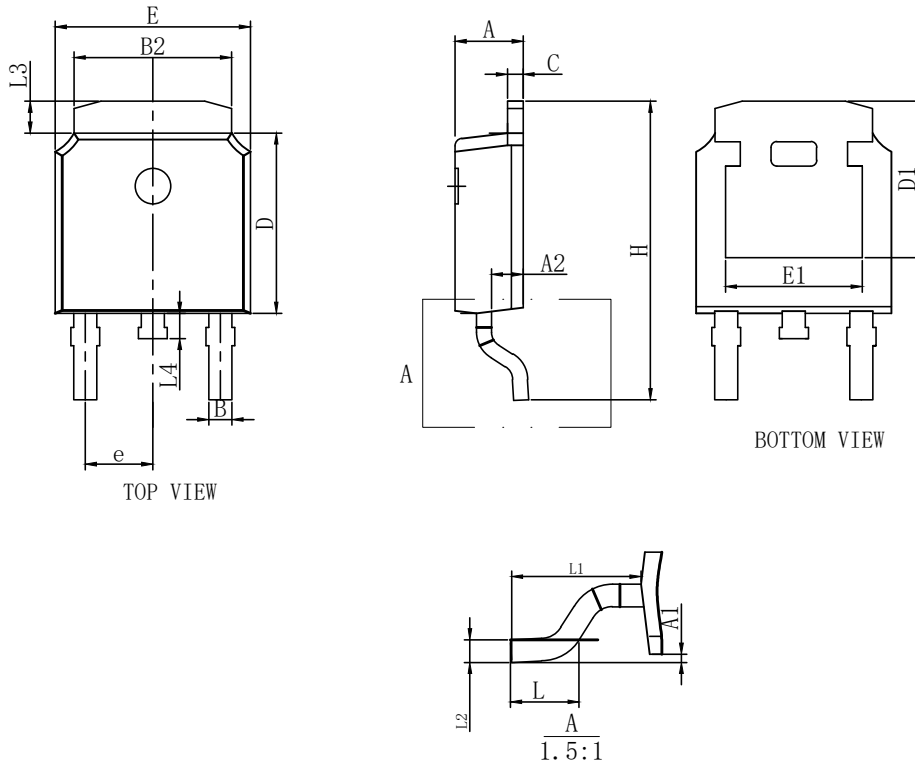
Parameters	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}C$	23	24	25	V
		$I_O = 5mA$ to $1.0A$, $P_o < 15W$ $V_I = 27V$ to $38V$	22.8	24	25.2	
Line Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $V_I = 27V$ to $38V$	-	-	480	mV
		$T_J = 25^{\circ}C$, $V_I = 30V$ to $36V$	-	-	240	
Load Regulation (Note3)	ΔV_O	$T_J = 25^{\circ}C$, $I_O = 5mA$ to $1.0A$	-	-	480	mV
		$T_J = 25^{\circ}C$, $I_O = 250mA$ to $750mA$	-	-	240	
Quiescent Current	I_Q	$T_J = 25^{\circ}C$	-	5	8	mA
Quiescent Current Change	ΔI_Q	$I_O = 5mA$ to $1.0A$	-	-	0.5	mA
		$I_O = 500mA$ $V_I = 27V$ to $38V$	-	-	1.0	
Output Voltage Drift	$\Delta V/\Delta T$	$I_O = 5mA$	-	2.1	-	mV/ $^{\circ}C$
Output Noise Voltage	V_N	$f = 10Hz$ to $100kHz$	-	42	-	$\mu V/V_O$
Ripple Rejection	RR	$f = 120Hz$, $V_I = 28V$ to $38V$	-	57	-	dB
Dropout Voltage	V_D	$T_J = 25^{\circ}C$, $I_O = 1.0A$	-	2	-	V
Output Resistance	R_O	$f = 1KHz$	-	28	-	m Ω
Short Circuit Current	ISC	$T_J = 25^{\circ}C$, $V_I = 35V$	-	200	-	mA

Note: 3. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.

Package Dimensions

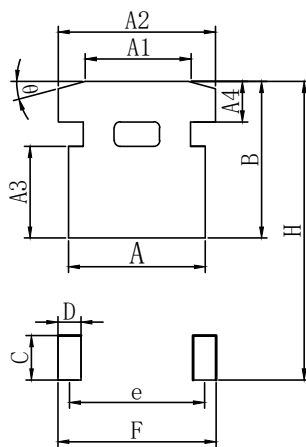
(All dimensions in millimeters)

TO-252 (DPAK)



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	2.15	2.30	2.45
A1	-	-	0.20
A2	0.90	1.07	1.17
B	0.68	0.78	0.88
B2	5.20	5.33	5.46
C	0.49	-	0.58
D	5.90	6.10	6.30
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	4.83	5.03
e	2.286BSC		
H	9.85	10.10	10.35
L	1.30	1.50	1.70
L1	2.90REF		
L2	0.51BSC		
L3	0.88	1.08	1.28
L4	0.55	0.80	1.05

Recommended PCB Layout (Unit: mm)



DIM	MIN(mm)
A	6.03
A1	4.50
A2	6.46
A3	4.10
A4	2.37
B	6.50
C	2.50
D	1.68
e	4.80
H	12.35
F	5.95

DISCLAIMER

- Curve guarantee in the specification. The curve of test items with electric parameter is used as quality guarantee. The curve of test items without electric parameter is used as reference only.
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