



# SEMICONDUCTOR TECHNICAL DATA

## FR7805P/D/DD ~ FR7824P/D/DD

THREE TERMINAL POSITIVE VOLTAGE REGULATORS  
5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V, 24V.

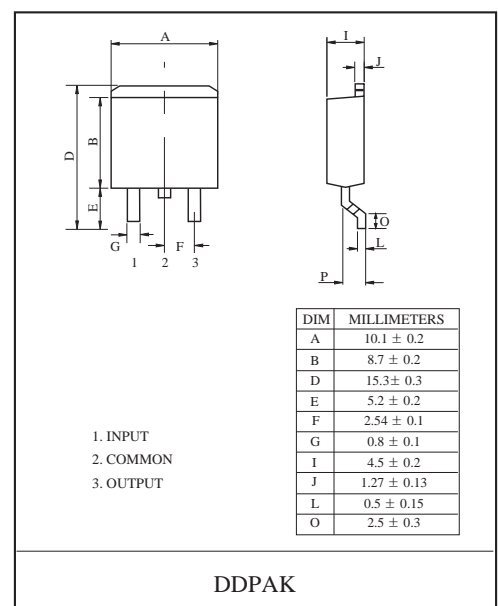
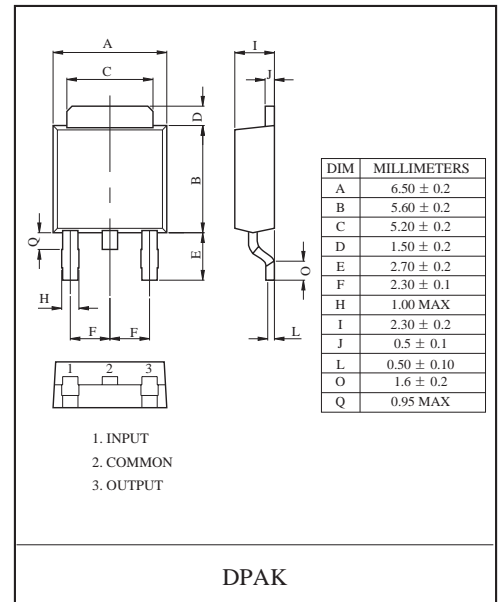
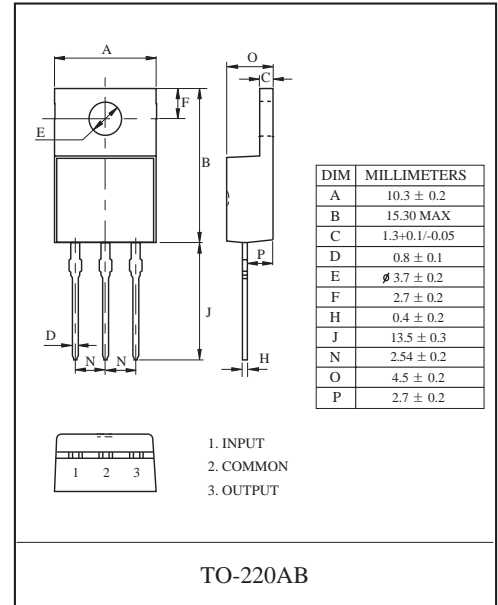
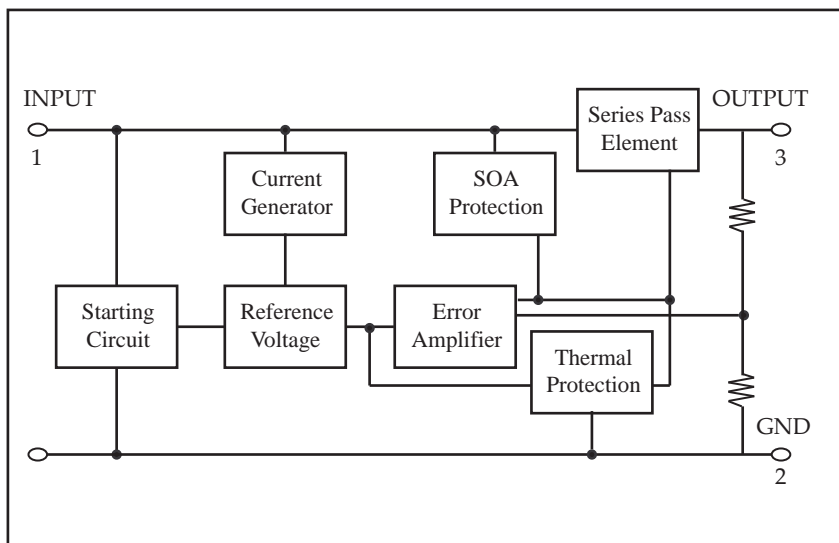
### FEATURES

- Suitable for C-MOS, TTL, the Other Digital IC's Power Supply.
- Internal Thermal Overload Protection.
- Internal Short Circuit Current Limiting.
- Output Current in Excess of 1A.
- Satisfies IEC-65 Specification. (International Electronical Commission).

### MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Input Voltage	FR7805 ~ FR7815	V <sub>IN</sub>	35	V
	FR7818 ~ FR7824		40	
Power Dissipation (Tc=25°C)		P <sub>D</sub> (TO-220AB)	20.8	W
Power Dissipation (Without Heatsink)		P <sub>D</sub> (TO-220AB)	1.5	W
Operating Junction Temperature		T <sub>j</sub>	-40 ~ 125	°C
Storage Temperature		T <sub>stg</sub>	-55 ~ 150	°C

### BLOCK DIAGRAM





# FR7805P/D/DD ~ FR7824P/D/DD

FR7805P/D/DD

ELECTRICAL CHARACTERISTICS ( $V_{IN}=10V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	$V_{OUT}$	1	$T_j=25^{\circ}C$ , $I_{OUT}=100mA$	4.8	5.0	5.2	V	
			$7.0V \leq V_{IN} \leq 20V$ $5.0mA \leq I_{OUT} \leq 1.0A$ , $P_o \leq 15W$	4.75	-	5.25		
Input Regulation	Reg line	1	$T_j=25^{\circ}C$	$7.0V \leq V_{IN} \leq 25V$	-	3	100	mV
				$8.0V \leq V_{IN} \leq 12V$	-	1	50	
Load Regulation	Reg load	1	$T_j=25^{\circ}C$	$5mA \leq I_{OUT} \leq 1.4A$	-	9	100	mV
				$250mA \leq I_{OUT} \leq 750mA$	-	4	50	
Quiescent Current	$I_B$	1	$T_j=25^{\circ}C$ , $I_{OUT}=5mA$	-	4.2	8.0	mA	
Quiescent Current Change	$\Delta I_B$	1	$7.0V \leq V_{IN} \leq 25V$	-	0.3	1.3	mA	
Output Noise Voltage	$V_{NO}$	1	$T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$ $I_{OUT}=50mA$	-	50	-	$\mu V_{rms}$	
Ripple Rejection Ratio	RR	1	$f=120Hz$ , $8.0V \leq V_{IN} \leq 18V$ , $I_{OUT}=50mA$ , $T_j=25^{\circ}C$	62	73	-	dB	
Dropout Voltage	$V_D$	1	$I_{OUT}=1.0A$ , $T_j=25^{\circ}C$	-	2.0	-	V	
Short Circuit Current Limit	$I_{SC}$	1	$T_j=25^{\circ}C$	-	230	-	mA	
Average Temperature Coefficient of Output Voltage	$TC_{VO}$	1	$I_{OUT}=5mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$	-	-0.8	-	mV/ $^{\circ}C$	



## FR7805P/D/DD ~ FR7824P/D/DD

FR7806P/D/DD

ELECTRICAL CHARACTERISTICS ( $V_{IN}=11V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	$V_{OUT}$	1	$T_j=25^{\circ}C$ , $I_{OUT}=100mA$	5.75	6.0	6.25	V	
			$8V \leq V_{IN} \leq 21V$ $5.0mA \leq I_{OUT} \leq 1.0A$ , $P_o \leq 15W$	5.7	-	6.3		
Input Regulation	Reg line	1	$T_j=25^{\circ}C$	$8.0V \leq V_{IN} \leq 25V$	-	4	120	mV
				$9V \leq V_{IN} \leq 13V$	-	2	60	
Load Regulation	Reg load	1	$T_j=25^{\circ}C$	$5mA \leq I_{OUT} \leq 1.4A$	-	9	120	mV
				$250mA \leq I_{OUT} \leq 750mA$	-	3	60	
Quiescent Current	$I_B$	1	$T_j=25^{\circ}C$ , $I_{OUT}=5mA$	-	5	8.0	mA	
Quiescent Current Change	$\Delta I_B$	1	$8V \leq V_{IN} \leq 25V$	-	-	1.3	mA	
Output Noise Voltage	$V_{NO}$	1	$T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$ $I_{OUT}=50mA$	-	45	-	$\mu V_{rms}$	
Ripple Rejection Ratio	RR	1	$f=120Hz$ , $9V \leq V_{IN} \leq 19V$ , $I_{OUT}=50mA$ , $T_j=25^{\circ}C$	61	75	-	dB	
Dropout Voltage	$V_D$	1	$I_{OUT}=1.0A$ , $T_j=25^{\circ}C$	-	2.0	-	V	
Short Circuit Current Limit	$I_{SC}$	1	$T_j=25^{\circ}C$	-	250	-	mA	
Average Temperature Coefficient of Output Voltage	$TC_{VO}$	1	$I_{OUT}=5mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$	-	-0.7	-	mV/ $^{\circ}C$	



# FR7805P/D/DD ~ FR7824P/D/DD

FR7808P/D/DD

ELECTRICAL CHARACTERISTICS ( $V_{IN}=14V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	$V_{OUT}$	1	$T_j=25^{\circ}C$ , $I_{OUT}=100mA$	7.7	8.0	8.3	V	
			$10.5V \leq V_{IN} \leq 23V$ $5.0mA \leq I_{OUT} \leq 1.0A$ , $P_o \leq 15W$	7.6	-	8.4		
Input Regulation	Reg line	1	$T_j=25^{\circ}C$	$10.0V \leq V_{IN} \leq 25V$	-	6	160	mV
				$11V \leq V_{IN} \leq 17V$	-	2	80	
Load Regulation	Reg load	1	$T_j=25^{\circ}C$	$5mA \leq I_{OUT} \leq 1.4A$	-	12	160	mV
				$250mA \leq I_{OUT} \leq 750mA$	-	4	80	
Quiescent Current	$I_B$	1	$T_j=25^{\circ}C$ , $I_{OUT}=5mA$	-	4.3	8.0	mA	
Quiescent Current Change	$\Delta I_B$	1	$10.5V \leq V_{IN} \leq 25V$	-	0.5	1.0	mA	
Output Noise Voltage	$V_{NO}$	1	$T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$ $I_{OUT}=50mA$	-	52	-	$\mu V_{rms}$	
Ripple Rejection Ratio	RR	1	$f=120Hz$ , $11.5V \leq V_{IN} \leq 21.5V$ , $I_{OUT}=50mA$ , $T_j=25^{\circ}C$	56	74	-	dB	
Dropout Voltage	$V_D$	1	$I_{OUT}=1.0A$ , $T_j=25^{\circ}C$	-	2.0	-	V	
Short Circuit Current Limit	$I_{SC}$	1	$T_j=25^{\circ}C$	-	230	-	mA	
Average Temperature Coefficient of Output Voltage	$TC_{VO}$	1	$I_{OUT}=5mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$	-	-0.8	-	mV/ $^{\circ}C$	



# FR7805P/D/DD ~ FR7824P/D/DD

FR7809P/D/DD

ELECTRICAL CHARACTERISTICS ( $V_{IN}=15V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	$V_{OUT}$	1	$T_j=25^{\circ}C$ , $I_{OUT}=100mA$	8.65	9.0	9.35	V	
			$11.5V \leq V_{IN} \leq 26V$ $5.0mA \leq I_{OUT} \leq 1.0A$ , $P_o \leq 15W$	8.6	9.0	9.4		
Input Regulation	Reg line	1	$T_j=25^{\circ}C$	$11.5V \leq V_{IN} \leq 26V$	-	7.0	180	mV
				$13V \leq V_{IN} \leq 19V$	-	2.5	90	
Load Regulation	Reg load	1	$T_j=25^{\circ}C$	$5mA \leq I_{OUT} \leq 1.4A$	-	12	180	mV
				$250mA \leq I_{OUT} \leq 750mA$	-	4.0	90	
Quiescent Current	$I_B$	1	$T_j=25^{\circ}C$ , $I_{OUT}=5mA$	-	4.3	8.0	mA	
Quiescent Current Change	$\Delta I_B$	1	$11.5V \leq V_{IN} \leq 26V$	-	-	1.3	mA	
Output Noise Voltage	$V_{NO}$	1	$T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$ $I_{OUT}=50mA$	-	58	-	$\mu V_{rms}$	
Ripple Rejection Ratio	RR	1	$f=120Hz$ , $12.5V \leq V_{IN} \leq 22.5V$ , $I_{OUT}=50mA$ , $T_j=25^{\circ}C$	56	71	-	dB	
Dropout Voltage	$V_D$	1	$I_{OUT}=1.0A$ , $T_j=25^{\circ}C$	-	2.0	-	V	
Short Circuit Current Limit	$I_{SC}$	1	$T_j=25^{\circ}C$	-	250	-	mA	
Average Temperature Coefficient of Output Voltage	$TC_{VO}$	1	$I_{OUT}=5mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$	-	-1	-	mV/ $^{\circ}C$	



# FR7805P/D/DD ~ FR7824P/D/DD

FR7810P/D/DD

ELECTRICAL CHARACTERISTICS ( $V_{IN}=16V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	$V_{OUT}$	1	$T_j=25^{\circ}C$ , $I_{OUT}=100mA$	9.6	10.0	10.4	V	
			$12.5V \leq V_{IN} \leq 25V$ $5.0mA \leq I_{OUT} \leq 1.0A$ , $P_o \leq 15W$	9.5	-	10.5		
Input Regulation	Reg line	1	$T_j=25^{\circ}C$	$12.5V \leq V_{IN} \leq 27V$	-	8	200	mV
				$14V \leq V_{IN} \leq 20V$	-	2.5	100	
Load Regulation	Reg load	1	$T_j=25^{\circ}C$	$5mA \leq I_{OUT} \leq 1.4A$	-	12	200	mV
				$250mA \leq I_{OUT} \leq 750mA$	-	4	100	
Quiescent Current	$I_B$	1	$T_j=25^{\circ}C$ , $I_{OUT}=5mA$	-	4.3	8.0	mA	
Quiescent Current Change	$\Delta I_B$	1	$12.5V \leq V_{IN} \leq 29V$	-	-	1.0	mA	
Output Noise Voltage	$V_{NO}$	1	$T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$ $I_{OUT}=50mA$	-	58	-	$\mu V_{rms}$	
Ripple Rejection Ratio	RR	1	$f=120Hz$ , $13.5V \leq V_{IN} \leq 23.5V$ , $I_{OUT}=50mA$ , $T_j=25^{\circ}C$	55	71	-	dB	
Dropout Voltage	$V_D$	1	$I_{OUT}=1.0A$ , $T_j=25^{\circ}C$	-	2.0	-	V	
Short Circuit Current Limit	$I_{SC}$	1	$T_j=25^{\circ}C$	-	250	-	mA	
Average Temperature Coefficient of Output Voltage	$TC_{VO}$	1	$I_{OUT}=5mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$	-	-1	-	mV/ $^{\circ}C$	



# FR7805P/D/DD ~ FR7824P/D/DD

FR7812P/D/DD

ELECTRICAL CHARACTERISTICS ( $V_{IN}=19V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	$V_{OUT}$	1	$T_j=25^{\circ}C$ , $I_{OUT}=100mA$	11.5	12.0	12.5	V	
			$14.5V \leq V_{IN} \leq 27V$ $5.0mA \leq I_{OUT} \leq 1.0A$ , $P_o \leq 15W$	11.4	-	12.6		
Input Regulation	Reg line	1	$T_j=25^{\circ}C$	$14.5V \leq V_{IN} \leq 30V$	-	10	240	mV
				$16V \leq V_{IN} \leq 22V$	-	3	120	
Load Regulation	Reg load	1	$T_j=25^{\circ}C$	$5mA \leq I_{OUT} \leq 1.4A$	-	12	240	mV
				$250mA \leq I_{OUT} \leq 750mA$	-	4	120	
Quiescent Current	$I_B$	1	$T_j=25^{\circ}C$ , $I_{OUT}=5mA$	-	5.1	8.0	mA	
Quiescent Current Change	$\Delta I_B$	1	$14.5V \leq V_{IN} \leq 30V$	-	-	1.0	mA	
Output Noise Voltage	$V_{NO}$	1	$T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$ $I_{OUT}=50mA$	-	76	-	$\mu V_{rms}$	
Ripple Rejection Ratio	RR	1	$f=120Hz$ , $15V \leq V_{IN} \leq 25V$ , $I_{OUT}=50mA$ , $T_j=25^{\circ}C$	55	71	-	dB	
Dropout Voltage	$V_D$	1	$I_{OUT}=1.0A$ , $T_j=25^{\circ}C$	-	2.0	-	V	
Short Circuit Current Limit	$I_{SC}$	1	$T_j=25^{\circ}C$	-	250	-	mA	
Average Temperature Coefficient of Output Voltage	$TC_{VO}$	1	$I_{OUT}=5mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$	-	-1	-	mV/ $^{\circ}C$	



# FR7805P/D/DD ~ FR7824P/D/DD

FR7815P/D/DD

ELECTRICAL CHARACTERISTICS ( $V_{IN}=23V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	$V_{OUT}$	1	$T_j=25^{\circ}C$ , $I_{OUT}=100mA$	14.4	15.0	15.6	V	
			$17.5V \leq V_{IN} \leq 30V$ $5.0mA \leq I_{OUT} \leq 1.0A$ , $P_o \leq 15W$	14.25	-	15.75		
Input Regulation	Reg line	1	$T_j=25^{\circ}C$	$17.5V \leq V_{IN} \leq 30V$	-	11	300	mV
				$20V \leq V_{IN} \leq 26V$	-	3	150	
Load Regulation	Reg load	1	$T_j=25^{\circ}C$	$5mA \leq I_{OUT} \leq 1.4A$	-	12	300	mV
				$250mA \leq I_{OUT} \leq 750mA$	-	4	150	
Quiescent Current	$I_B$	1	$T_j=25^{\circ}C$ , $I_{OUT}=5mA$	-	5.2	8.0	mA	
Quiescent Current Change	$\Delta I_B$	1	$17.5V \leq V_{IN} \leq 30V$	-	-	1.0	mA	
Output Noise Voltage	$V_{NO}$	1	$T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$ $I_{OUT}=50mA$	-	90	-	$\mu V_{rms}$	
Ripple Rejection Ratio	RR	1	$f=120Hz$ , $18.5V \leq V_{IN} \leq 28.5V$ , $I_{OUT}=50mA$ , $T_j=25^{\circ}C$	54	70	-	dB	
Dropout Voltage	$V_D$	1	$I_{OUT}=1.0A$ , $T_j=25^{\circ}C$	-	2.0	-	V	
Short Circuit Current Limit	$I_{SC}$	1	$T_j=25^{\circ}C$	-	250	-	mA	
Average Temperature Coefficient of Output Voltage	$TC_{VO}$	1	$I_{OUT}=5mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$	-	-1	-	mV/ $^{\circ}C$	





## FR7805P/D/DD ~ FR7824P/D/DD

FR7818P/D/DD

ELECTRICAL CHARACTERISTICS ( $V_{IN}=27V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	$V_{OUT}$	1	$T_j=25^{\circ}C$ , $I_{OUT}=100mA$	17.3	18.0	18.7	V	
			$21V \leq V_{IN} \leq 33V$ $5.0mA \leq I_{OUT} \leq 1.0A$ , $P_o \leq 15W$	17.1	-	18.9		
Input Regulation	Reg line	1	$T_j=25^{\circ}C$	$21V \leq V_{IN} \leq 33V$	-	13	360	mV
				$24V \leq V_{IN} \leq 30V$	-	4	180	
Load Regulation	Reg load	1	$T_j=25^{\circ}C$	$5mA \leq I_{OUT} \leq 1.4A$	-	15	360	mV
				$250mA \leq I_{OUT} \leq 750mA$	-	5	180	
Quiescent Current	$I_B$	1	$T_j=25^{\circ}C$ , $I_{OUT}=5mA$	-	5.2	8.0	mA	
Quiescent Current Change	$\Delta I_B$	1	$21V \leq V_{IN} \leq 33V$	-	-	1.0	mA	
Output Noise Voltage	$V_{NO}$	1	$T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$ $I_{OUT}=50mA$	-	110	-	$\mu V_{rms}$	
Ripple Rejection Ratio	RR	1	$f=120Hz$ , $22V \leq V_{IN} \leq 32V$ , $I_{OUT}=50mA$ , $T_j=25^{\circ}C$	52	69	-	dB	
Dropout Voltage	$V_D$	1	$I_{OUT}=1.0A$ , $T_j=25^{\circ}C$	-	2.0	-	V	
Short Circuit Current Limit	$I_{SC}$	1	$T_j=25^{\circ}C$	-	250	-	mA	
Average Temperature Coefficient of Output Voltage	$TC_{VO}$	1	$I_{OUT}=5mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$	-	-1	-	mV/ $^{\circ}C$	



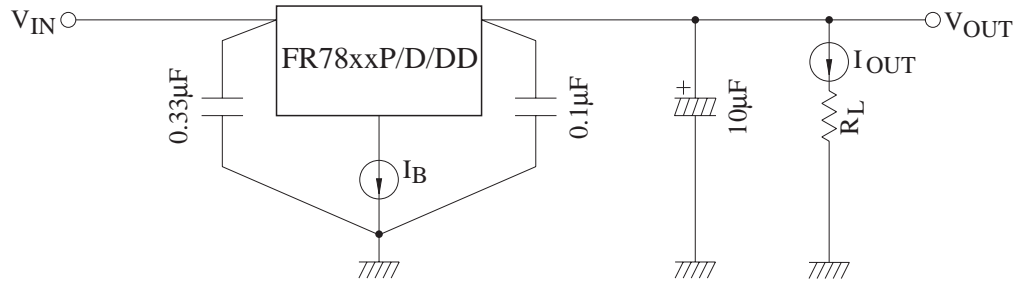
# FR7805P/D/DD ~ FR7824P/D/DD

FR7824P/D/DD

ELECTRICAL CHARACTERISTICS ( $V_{IN}=33V$ ,  $I_{OUT}=500mA$ ,  $0^{\circ}C \leq T_j \leq 125^{\circ}C$ )

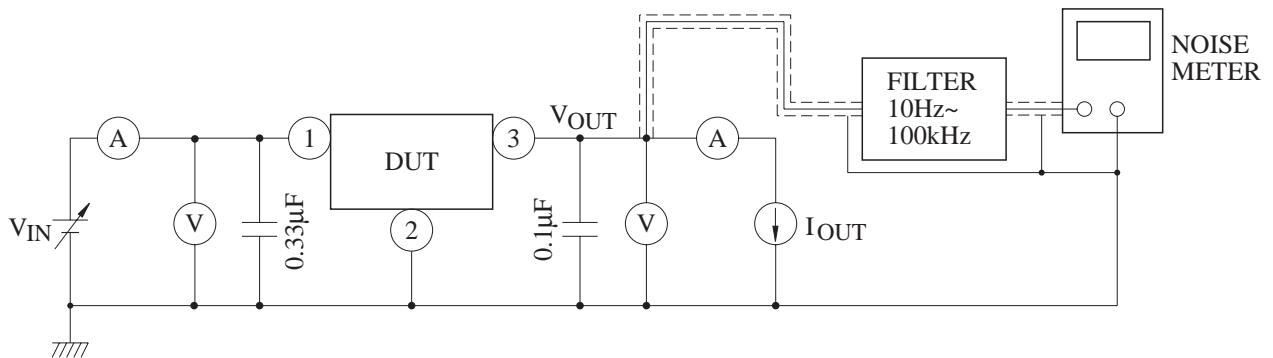
CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	$V_{OUT}$	1	$T_j=25^{\circ}C$ , $I_{OUT}=100mA$	23.0	24.0	25.0	V	
			$27V \leq V_{IN} \leq 38V$ $5.0mA \leq I_{OUT} \leq 1.0A$ , $P_o \leq 15W$	22.8	-	25.2		
Input Regulation	Reg line	1	$T_j=25^{\circ}C$	$27V \leq V_{IN} \leq 38V$	-	18	480	mV
				$30V \leq V_{IN} \leq 36V$	-	6	240	
Load Regulation	Reg load	1	$T_j=25^{\circ}C$	$5mA \leq I_{OUT} \leq 1.4A$	-	15	480	mV
				$250mA \leq I_{OUT} \leq 750mA$	-	5	240	
Quiescent Current	$I_B$	1	$T_j=25^{\circ}C$ , $I_{OUT}=5mA$	-	5.2	8.0	mA	
Quiescent Current Change	$\Delta I_B$	1	$27V \leq V_{IN} \leq 38V$	-	-	1.0	mA	
Output Noise Voltage	$V_{NO}$	1	$T_a=25^{\circ}C$ , $10Hz \leq f \leq 100kHz$ $I_{OUT}=50mA$	-	60	-	$\mu V_{rms}$	
Ripple Rejection Ratio	RR	1	$f=120Hz$ , $28V \leq V_{IN} \leq 38V$ , $I_{OUT}=50mA$ , $T_j=25^{\circ}C$	50	67	-	dB	
Dropout Voltage	$V_D$	1	$I_{OUT}=1.0A$ , $T_j=25^{\circ}C$	-	2.0	-	V	
Short Circuit Current Limit	$I_{SC}$	1	$T_j=25^{\circ}C$	-	230	-	mA	
Average Temperature Coefficient of Output Voltage	$TC_{VO}$	1	$I_{OUT}=5mA$ , $0^{\circ}C \leq T_j \leq 125^{\circ}C$	-	-1.5	-	mV/ $^{\circ}C$	

## TEST CIRCUIT1/STANDARD APPLICATION CIRCUIT

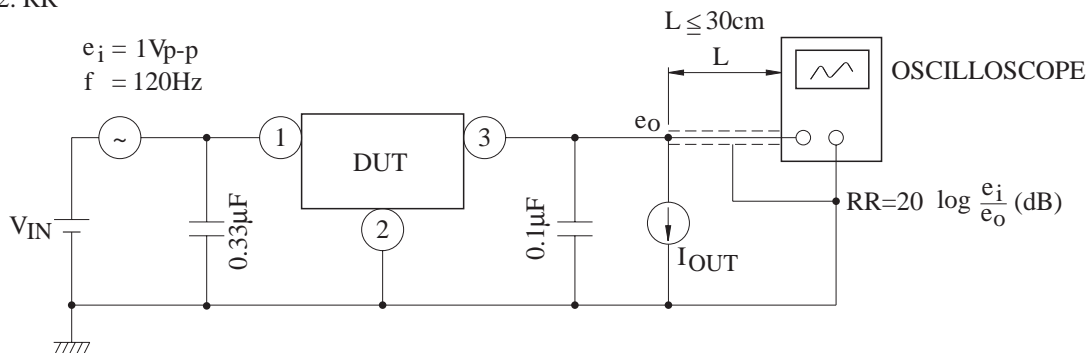


## TEST CIRCUIT

1.  $V_{OUT}$ , Reg · line, Reg · load,  $V_{OUT}$ ,  $I_B$ ,  $\Delta I_B$ ,  $V_{NO}$ ,  $\Delta V_{OUT}/\Delta t$ ,  $|V_{IN} - V_{OUT}|$ ,  $TC_{VO}$



2. RR





# R7805P/D/DD ~ FR7824P/D/DD

