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Semiconductor

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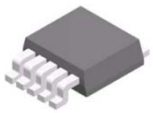
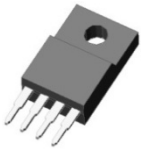
S52DMxxx

Low Dropout Voltage Regulator (0.5A Series)

SOP-8



TO-252-5L



TO-220F-4SL

ORDERING INFORMATION

Product	Marking	Package
S52DMxx	S52DMxx	SOP-8
S52DMxxD	S52DMxxD	TO-252-5L
S52DMxxPIC	S52DMxxPIC	TO-220F-4SL

▲ Marking Detail Information

[SOP8 PKG Marking]

S52DMxxx (①)
GYWW(②)

① Device Code

② Grade & Year & Week Code

[TO-220F-4SL & TO-252-5L PKG Marking]

AUK(①)
G△YWW (②)
S52DMxxx (③)

① AUK Logo

② Grade & M Code & Year & Week Code

③ Device Code

Description

The S52DMxxx is an efficient linear low dropout voltage regulator for various electronic equipment. It is designed to provide very low dropout voltage, and better than 2.4% output voltage accuracy.

And the S52DMxxx has various key features such as current limiting, over temperature shut-down, over voltage protection, enable pin, and low noise performance with an low noise option.

Furthermore, it is available in adjustable or fixed output voltages in SOP-8, TO-252-5L, TO-220F-4SL packages.

Application

◈ Consumer and personal electronics

◈ SMPS post-regulator / dc-to-dc modules

◈ High-efficiency linear power supplies

Features and Benefits

◈ Low Dropout Voltage for 0.5A Output : [Max. 500mV].

◈ Built in Thermal shut down circuit.

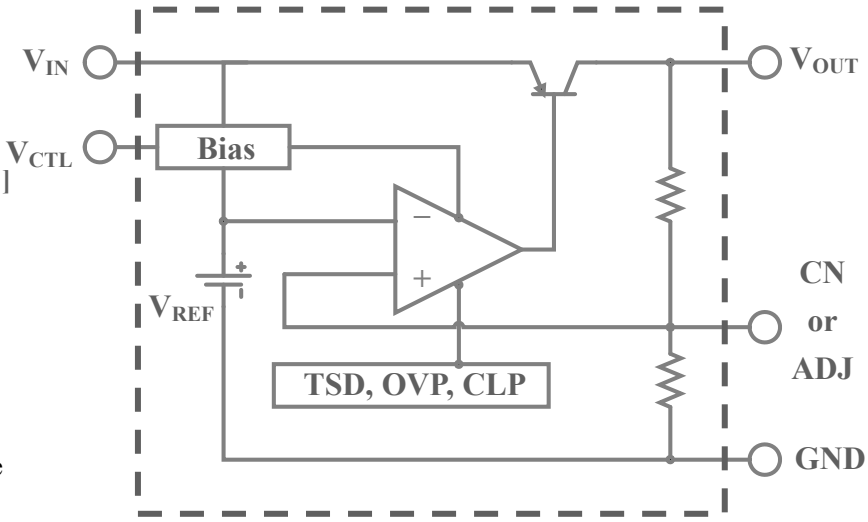
◈ Built in OVP, CLP circuit.

◈ Low Quiescent Current : [Typ. 2.0mA]

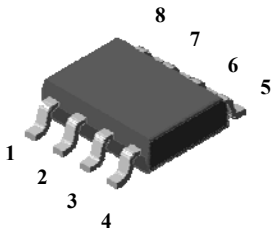
◈ Ultra High level of ESD [Built in ESD Protection Cell]

MM : 400V ↑ / HBM 3KV ↑

Equivalent Circuit

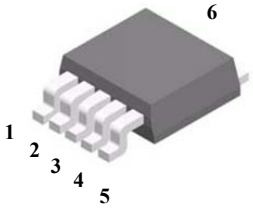


◈ Pin Configuration



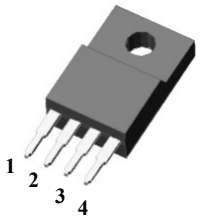
SOP-8

1: V_{CTL}
2: NC
3: GND
4: ADJ/CN
5: V_{OUT}
6,7: NC
8: V_{IN}



TO-252-5L

1: V_{IN}
2: V_{CTL}
3: V_{OUT}
4: ADJ/CN
5: GND
6: V_{OUT}



TO-220F-4SL

Fixed V_{OUT}	ADJ V_{OUT}
1: V_{IN}	1: V_{IN}
2: V_{OUT}	2: V_{OUT}
3: GND	3: GND
4: V_{CTL}	4: ADJ

◈ Product Line-up

Product Name	V_{OUT}	Operating Temperature	Package
S52DM00	ADJ.	-30~125℃	SOP-8
S52DM18	1.8V	-30~125℃	SOP-8
S52DM25	2.5V	-30~125℃	SOP-8
S52DM33	3.3V	-30~125℃	SOP-8
S52DM50	5.0V	-30~125℃	SOP-8
S52DM00D	ADJ.	-30~125℃	TO-252-5L
S52DM18D	1.8V	-30~125℃	TO-252-5L
S52DM25D	2.5V	-30~125℃	TO-252-5L
S52DM33D	3.3V	-30~125℃	TO-252-5L
S52DM50D	5.0V	-30~125℃	TO-252-5L
S52DM00PIC	ADJ.	-30~125℃	TO-220F-4SL
S52DM18PIC	1.8V	-30~125℃	TO-220F-4SL
S52DM25PIC	2.5V	-30~125℃	TO-220F-4SL
S52DM33PIC	3.3V	-30~125℃	TO-220F-4SL
S52DM50PIC	5.0V	-30~125℃	TO-220F-4SL

◈ Absolute Maximum Ratings (Ta = 25℃)

Parameter		Symbol	Limits	Unit
Input Voltage		V_{IN}	23.0	V
Power Dissipation	SOP-8	P_d	0.6(Note1)	W
	TO-220F-4SL		2.0(Note1)	
	TO-252-5L		1.5(Note1)	
Junction Temperature		T_J	150	℃
Operate Temperature Range		T_{opr}	-30 ~ +125	℃
Storage Temperature Range		T_{stg}	-55 ~ +150	℃

Note 1 : No Heat-sink

Absolute maximum ratings indicate limits beyond which damage to the component may occur. Electrical specifications do not apply when operating the device outside of its operating ratings. The maximum allowable power dissipation is a function of the maximum junction temperature, $T_{J(max)}$, the junction-to-ambient thermal resistance, θ_{JA}, and the ambient temperature, TA.
The maximum allowable power dissipation at any ambient temperature is calculated using:
$PD(max) = (T_{J(max)} - T_A) \div \theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown.

◈ Guaranteed Operating Conditions (Ta = 25℃)

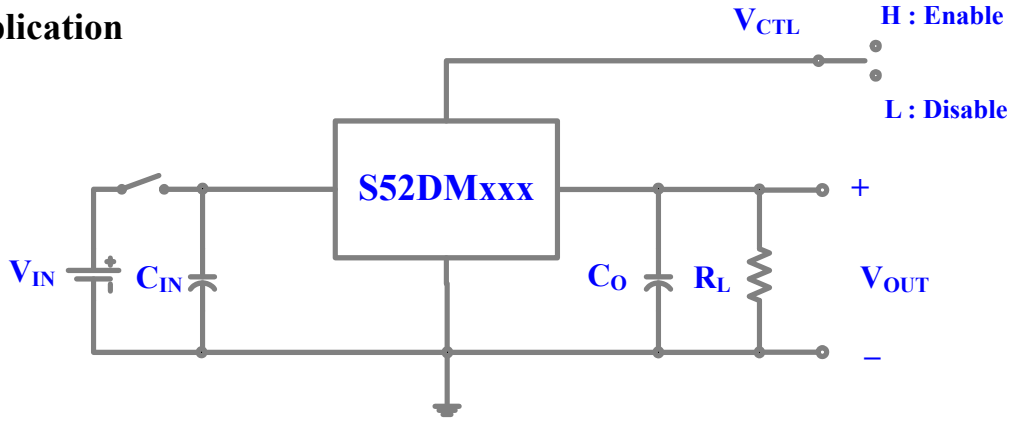
Parameter	Symbol	Limits	Unit
Supply Input Voltage	V_{IN}	Vo+0.5~20	V
Enable Input Voltage	V_{CTL}	0~ V_{IN}	V
Output Current	I_{OUT}	0~ 0.5	A

◈ Electrical characteristics

(V_{IN}=V_{OUT}+1.0V, C_{IN} = 0.33uF, C_{OUT} = 47 uF, I_{OUT} = 5mA, T_J=25℃ ; unless noted)

NO	Characteristics		Symbol	Condition	Specification			Unit
					MIN.	TYP.	MAX.	
1	Output Voltage	S52DM00x	V_{OUT}	Variation from nominal V_{OUT}	1.215	1.240	1.265	V
		S52DM18x			1.764	1.800	1.836	V
		S52DM25x			2.450	2.500	2.550	V
		S52DM33x			3.234	3.300	3.366	V
		S52DM50x			4.900	5.000	5.100	V
2	Line Regulation		V_{LINE}	V_{IN}=V_{OUT}+1V to 12V, I_{OUT}=5mA	-	0.05	0.5	%
3	Load Regulation		V_{LOAD}	V_{IN}=V_{OUT}+1V, I_{OUT}=5mA to 0.5A	-	0.1	1.0	%
4	Quiescent Current		I_{QC}	V_{IN}=V_{OUT}+1V to 20V, I_{OUT}=0mA	-	2.0	5.0	mA
5	Ripple Rejection		R・R	I_{OUT}=50mA, f=120Hz	53.0	65.0	-	dB
6	Dropout Voltage		V_{DROP}	I_{OUT}=0.5A	-	-	0.5	V
7	Current Limit		I_{LIMIT}	V_{IN}=V_{OUT}+1V	600	700	-	mA
8	Output Noise Voltage		V_{NO}	VIN=VOUT+1V, IOUT=50mA, 10Hz ≤ f ≤ 100kHz	-	100	-	uVrms
9	Output On state for V_{CTL}		$V_{CTL(ON)}$	-	2.0	-	-	V
10	Output OFF state for V_{CTL}		$V_{CTL(OFF)}$	-	-	-	0.8	V
11	Output On state for I_{CTL}		$I_{CTL(ON)}$	V_{CTL}=2.0V	-	-	20	uA
12	Output OFF state for I_{CTL}		$I_{CTL(OFF)}$	V_{CTL}=0.8V	-	-	0.1	uA

Typical Application



1) C_{IN} should be required if regulators are located far from power supply filter

2) C_O improves output stability and transient response ($C_O \geq$ 47uF)

Fig1. I_{QC} – T_J

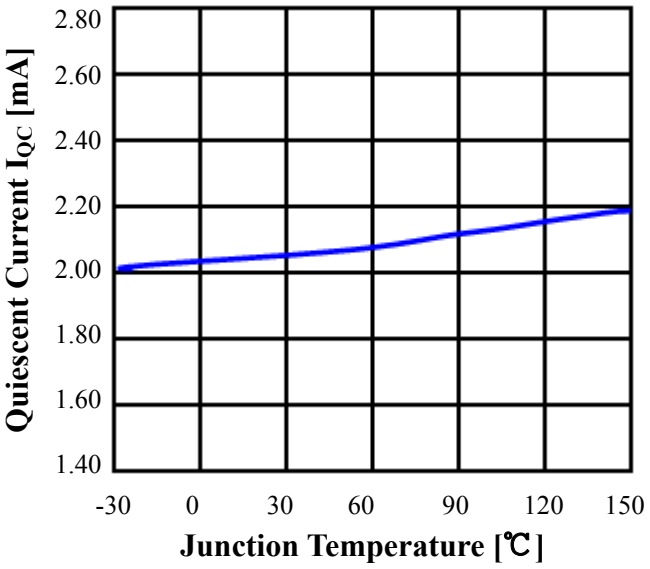


Fig2. V_{OUT} – T_J

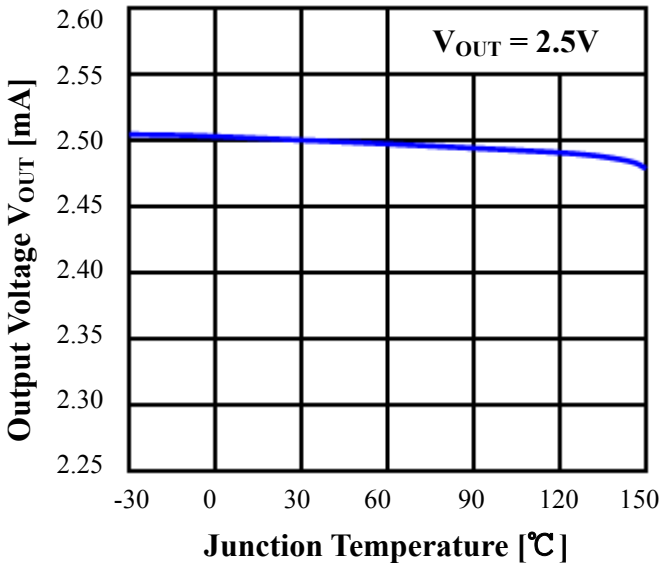
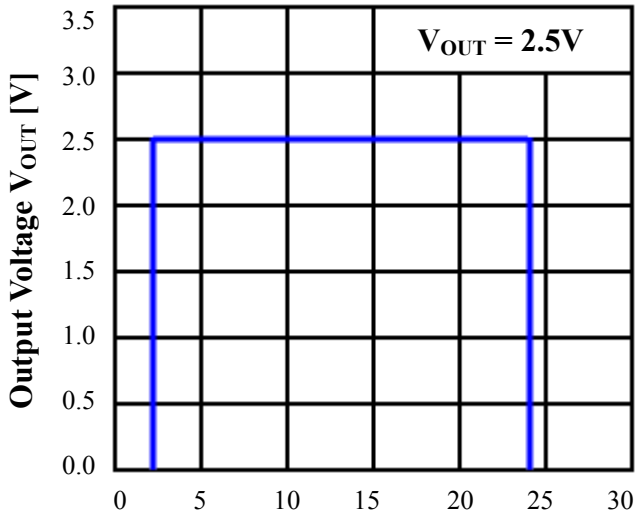
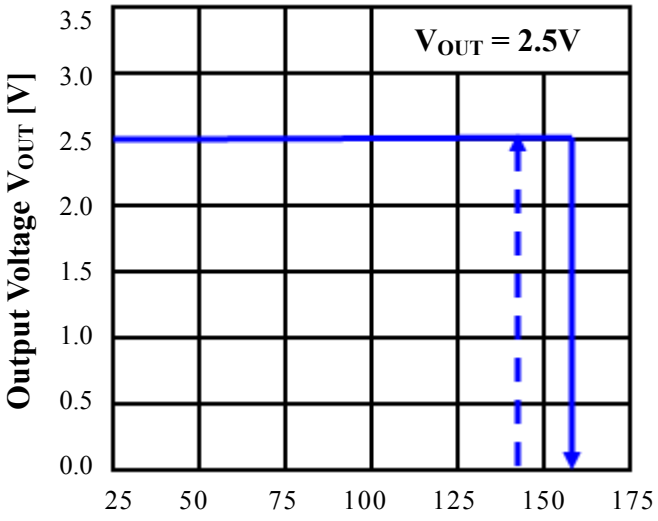


Fig3. V_{OUT} – V_{IN}



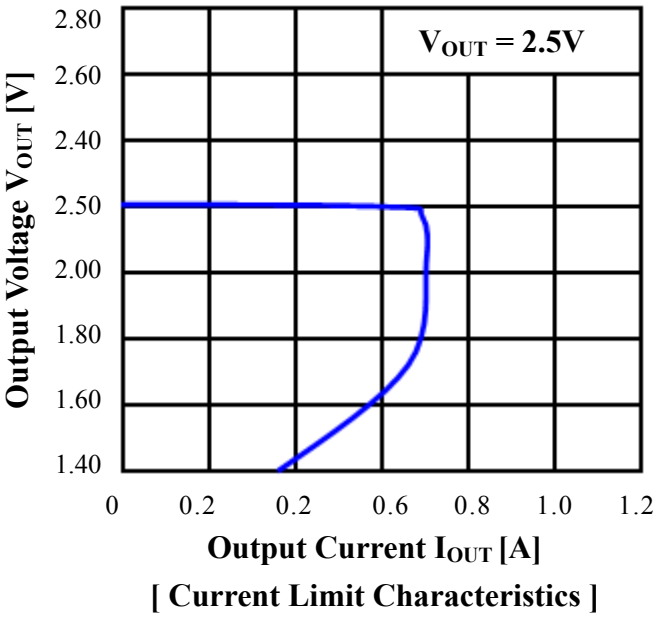
[Over-Voltage Protection]

Fig4. V_{OUT} – T_J



[Thermal Shut-down Protection]

Fig5. V_{OUT} – I_{OUT}



[Current Limit Characteristics]

Fig6. V_{OUT} – T_J

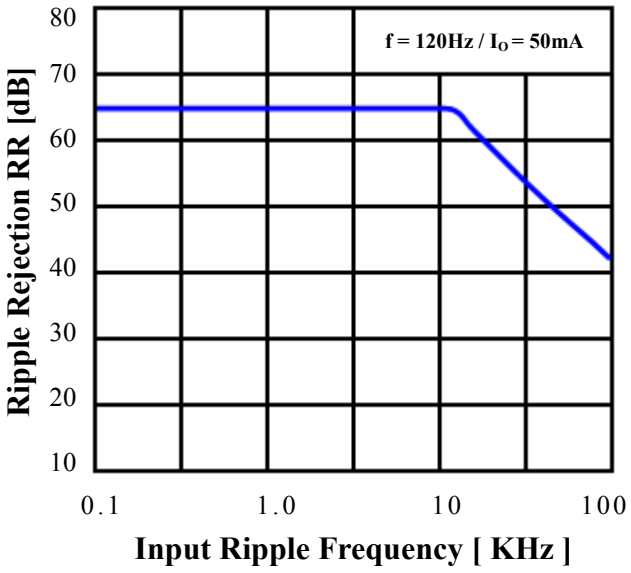


Fig7. V_{DROP} – T_J

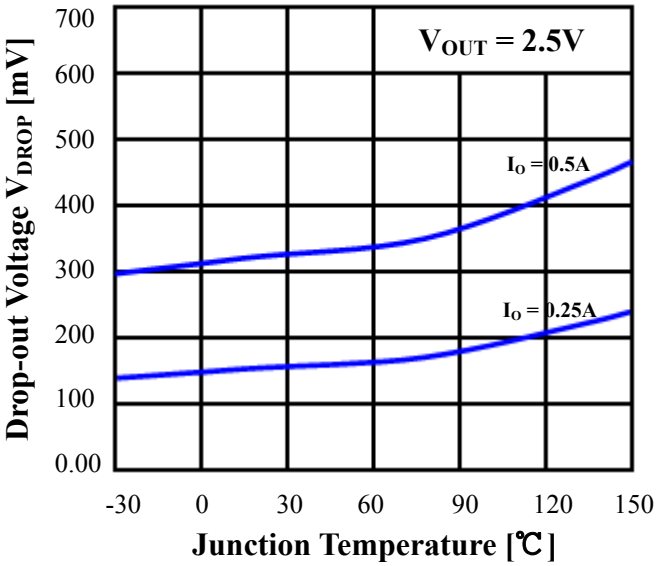


Fig.8 Line Transient Response

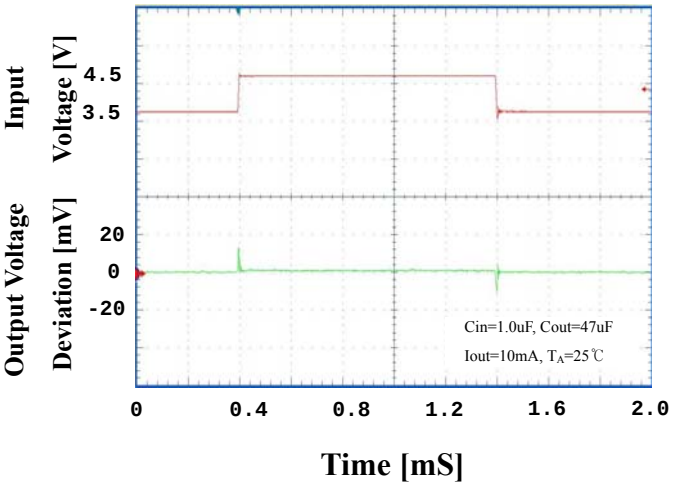


Fig.9 Line Transient Response

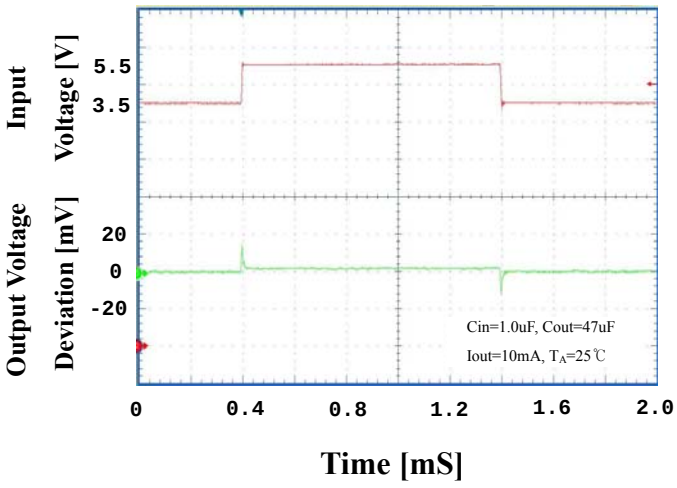


Fig.10 Load Transient Response

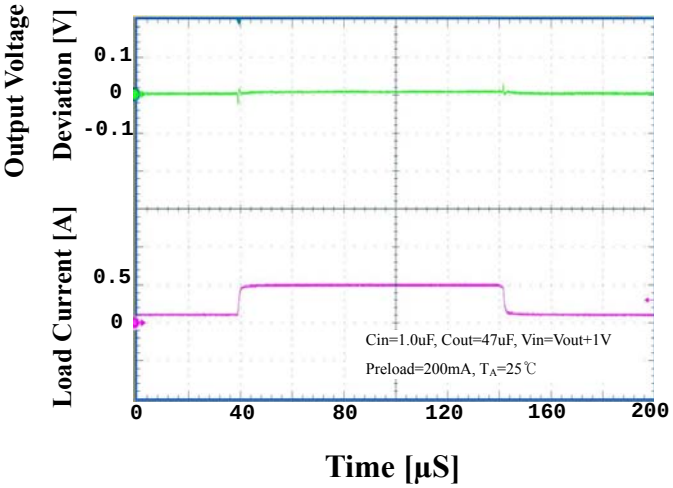
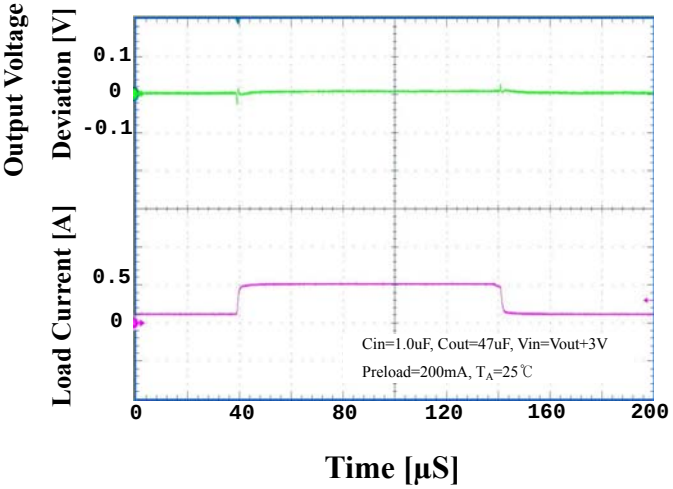
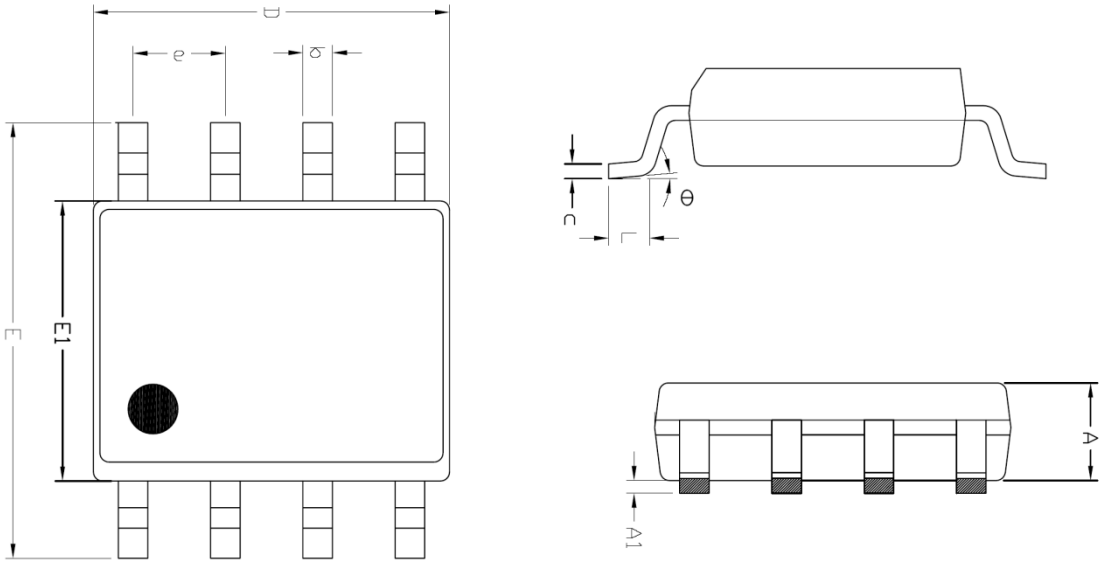


Fig.11 Load Transient Response

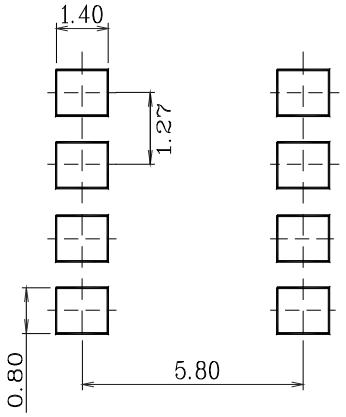


◈ SOP-8 Outline Dimension (Unit : mm)

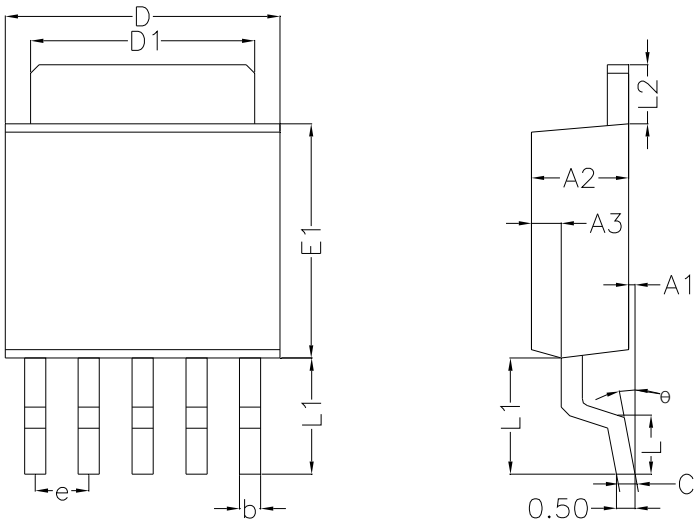


SYMBOL	MILLIMETER(mm)			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	1.245	—	1.445	
A1	0.125	0.175	0.275	
b	0.320	0.420	0.520	
c	0.170	0.220	0.270	
D	4.802	4.902	5.002	
E	5.870	6.020	6.170	
E1	3.761	3.861	3.961	
e	1.270 BSC			
L	0.462	0.562	0.662	
θ	0 °	—	8 °	

※ Recommend PCB solder land [Unit: mm]

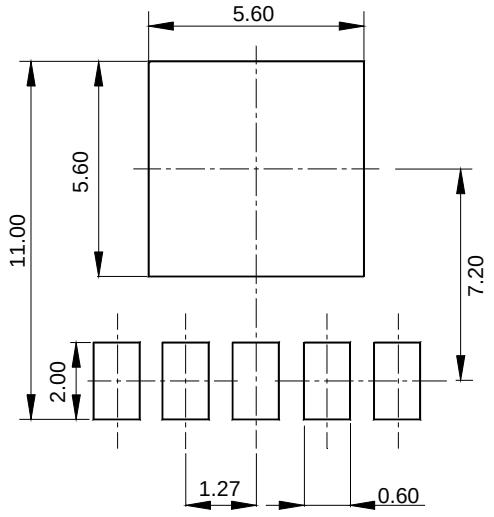


◈ TO-252-5L Outline Dimension (Unit : mm)

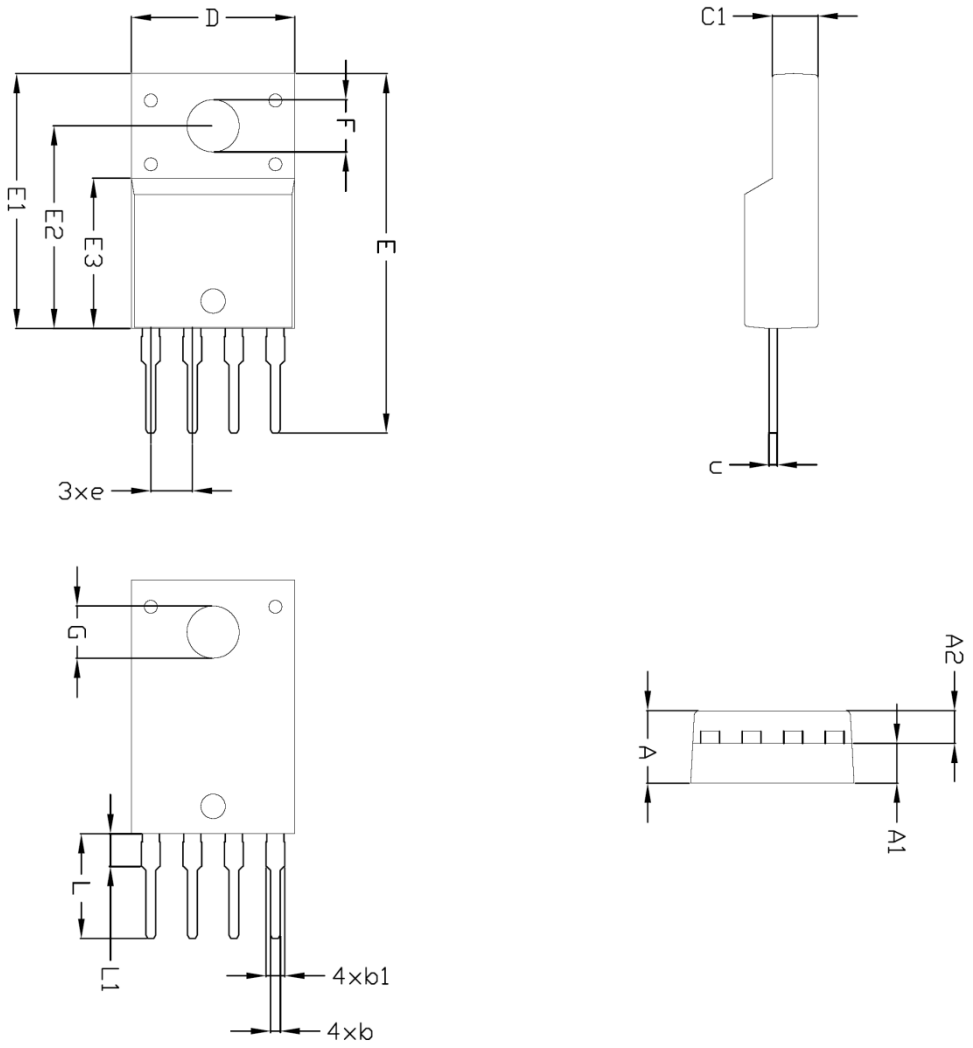


SYMBOL	MILLIMETER(mm)			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A1	0.05	0.15	0.25	
A2	2.10	2.30	2.50	
A3	0.50	0.60	0.70	
b	0.46	-	0.60	
C	0.49	-	0.56	
D	6.30	6.50	6.70	
D1		5.30REF		
E1	5.30	5.50	5.70	
e		1.27BSC		
L	1.40	1.50	1.60	
L1	3.00	3.10	3.20	
L2		1.40BSC		
θ	0 °	—	8 °	

※ Recommend PCB solder land [Unit: mm]



◈ TO-220F-4SL Outline Dimension (Unit : mm)



SYMBOL	MILLIMETERS			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	-	-	4.60	
A1	2.45	2.50	2.55	
A2	1.95	2.00	2.05	
b	0.50	0.60	0.70	
b1	0.85	1.05	1.25	
c	0.40	0.50	0.60	
c1	2.70	2.80	2.90	
D	9.90	10.00	10.10	
E	20.80	-	21.40	
E1	15.50	15.60	15.70	
E2	12.30	12.40	12.50	
E3	9.15	9.20	9.25	
F	3.10	3.20	3.30	
G	3.30	3.40	3.50	
e	2.54 BSC			
L	5.20	-	5.80	
L1	2.00 BSC			

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