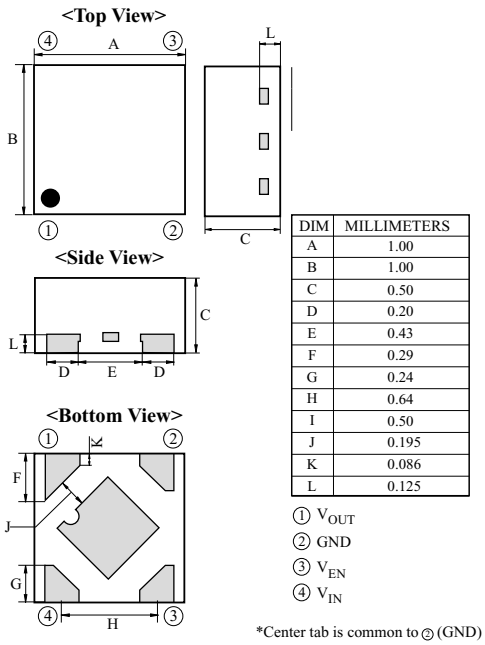
150mA CMOS High Performance LDO Regulator

The KIC3213series Low Dropout Linear Regulator is ideally suited for portable applications. It offers 1% initial accuracy, extremely-low dropout voltage(210mV at 150mA, 3.3V Output Type), low ground current (typically 36uA) and ultra small package(UDFN1010-4). Designed specifically for handheld and battery-powered devices, the KIC3213series provides a TTL-logic-compatible ON/OFF control pin. When disabled, power consumption drops nearly to zero. The KIC3213series also works with low-ESR ceramic capacitors, reducing the amount of board space necessary for power applications, critical in handheld wireless devices. The Line transient response and load transient response of the KIC3213series are very excellent, thus ICs are very suitable for the power supply for hand-held communication equipment.



DIM	MILLIMETERS
A	1.00
B	1.00
C	0.50
D	0.20
E	0.43
F	0.29
G	0.24
H	0.64
I	0.50
J	0.195
K	0.086
L	0.125

UDFN1010-4

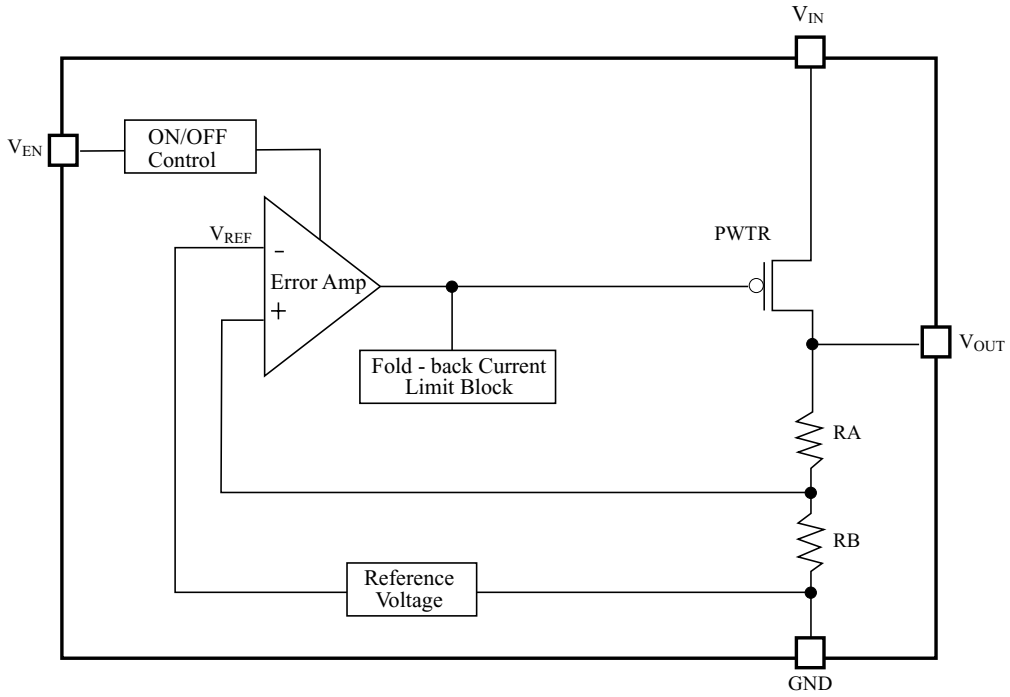
Applications

- Cellular phones,Smart Phones, PDA
- Battery-powered equipment
- Laptop, notebook and palmtop computers
- Consumer/personal electronics

Features

- Input voltage range ----------2.0V to 5.5V
- High output accuracy----------1.0% accuracy
- Low dropout----------210mV@150mA (3.3V Output type)
- Stability with ceramic output capacitors
- Supply Current----------Typ. 36uA
- Excellent Load regulation----------Typ. 30mV
- Built-in Fold Back Protection Circuit -------Typ. 40mA@Short mode
- Stability with ceramic output capacitors-----C_{IN}=C_{OUT}=0.47μF
- TTL-Logic-compatible ON/OFF control

Block Diagram



SECLECTION GUIDE

The output voltage, package type for the ICs can be selected at the user s request.

The selection can be made with designating the part number as shown below;

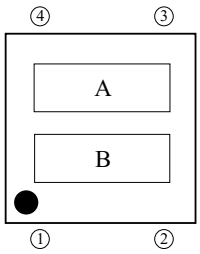
KIC3213MF XX ← Part Number

a b c

Code	Contents
a	Item name KIC3213 : 150mA CMOS LDO
b	Designation of Package Type : **MF : UDFN1010-4**
c	Setting Output Voltage (V_{OUT}) : Stepwise setting with a step of 0.1V in the range of 1.2V to 3.3V is possible.

PIN DESCRIPTIONS

UDFN1010-4 PKG



Pin No.	Pin name	Pin Description
1	V_{OUT}	Regulator Output Pin.
2	GND	Ground Pin.
3	V_{EN}	Output OFF/ON (Input) : CMOS compatible input. Active High : Output ON.
4	V_{IN}	Input Pin.

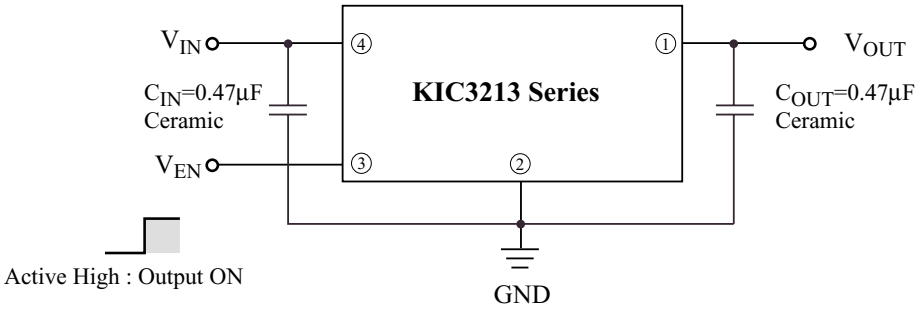
Code	Contents
A	Device code & Series*
B	Lot No.

* Please refer to the Line up table

Line up

Item	Output Voltage	Marking	Package	Item	Output Voltage	Marking	Package
KIC3213MF12	1.2V	9A		KIC3213MF23	2.3V	9L	
KIC3213MF13	1.3V	9B		KIC3213MF24	2.4V	9M	
KIC3213MF14	1.4V	9C		KIC3213MF25	2.5V	9N	
KIC3213MF15	1.5V	9D		KIC3213MF26	2.6V	9O	
KIC3213MF16	1.6V	9E		KIC3213MF27	2.7V	9P	
KIC3213MF17	1.7V	9F	UDFN1010-4	KIC3213MF28	2.8V	9Q	UDFN1010-4
KIC3213MF18	1.8V	9G		KIC3213MF29	2.9V	9R	
KIC3213MF19	1.9V	9H		KIC3213MF30	3.0V	9S	
KIC3213MF20	2.0V	9I		KIC3213MF31	3.1V	9T	
KIC3213MF21	2.1V	9J		KIC3213MF32	3.2V	9U	
KIC3213MF22	2.2V	9K		KIC3213MF33	3.3V	9V	

Application Circuit



Stability with ceramic output capacitors $C_{IN} = C_{OUT} = 0.47\mu F$

Absolute Maximum Ratings

Characteristics	Symbol	Rating	Units
Input Voltage	V_{IN}	5.5	V
Output Current	I_{OUT}	150	mA
Power Dissipation (Note)	P_D	400	mW
Operating Junction Temperature	$T_{j(opr)}$	-40~125	℃
Storage Temperature	T_{STG}	-55~150	℃

Note) Package Mounted on FR-4 PCB board (40㎜×40㎜×1.6㎜)

Electrical Characteristics

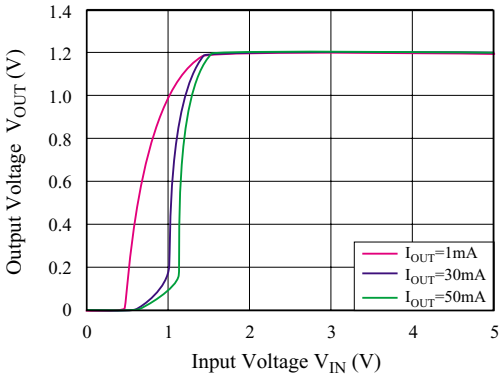
(V_{IN} = Set V_{OUT} + 1V for V_{OUT} options greater than 1.5V, V_{IN}=2.5V for $V_{OUT} \leq$ 1.5V
I_{OUT}=1mA, V_{EN}=V_{IN}, T_A=25℃, C_{IN}=0.47 μF, C_{OUT}=0.47 μF, unless otherwise stated)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IN}	Input Voltage	-	2.0	-	5.5	V
I_{OUT}	Output Current	-	150	-	-	mA
V_{OUT}	Output Voltage	$V_{OUT} \geq$ 1.5V	x 0.99	-	x 1.01	V
		$V_{OUT} \leq$ 1.5V	-20	-	+20	mV
$\Delta V_{OUT} / \Delta V_{IN}$	Line Regulation	Set V_{OUT} + 0.5V $\leq$ $V_{IN} \leq$ 5.5V	-	0.02	0.1	% / V
$\Delta V_{OUT} / \Delta I_{OUT}$	Load Regulation	1mA $\leq$ $I_{OUT} \leq$ 150mA	-	30	50	mV
V_D	Dropout Voltage	1.2V $\leq$ $V_{OUT} \leq$ 1.5V	-	0.50	0.62	V
		1.5V $\leq$ $V_{OUT} \leq$ 1.7V	-	0.38	0.47	V
		1.7V $\leq$ $V_{OUT} \leq$ 2.0V	-	0.34	0.42	V
		2.0V $\leq$ $V_{OUT} \leq$ 2.5V	-	0.28	0.36	V
		2.5V $\leq$ $V_{OUT} \leq$ 2.8V	-	0.22	0.30	V
		2.8V $\leq$ $V_{OUT} \leq$ 3.3V	-	0.21	0.27	V
I_{GND}	Ground Pin Current	I_{OUT} = 0mA	-	36	50	μA
I_Q	Quiescent Current	V_{EN} = 0V(Shutdown)	-	0.1	1.0	μA
$\Delta V_{OUT} / \Delta T_a$	Output VoltageTemperature Coefficient	-40℃ $\leq$ $T_{OPR} \leq$ 85℃	-	±100	-	ppm / ℃
I_{SC}	Short Current Limit	V_{OUT} = 0V	-	40	-	mA
$V_{EN(ON)}$	Output Control Voltage (ON-State)	-	1.1	-	5.5	V
$V_{EN(OFF)}$	Output Control Voltage (OFF-State)	-	0	-	0.3	V
PSRR	Power Supply Ripple Rejection	f=1kHz, Ripple 0.2Vp-p V_{IN}=Set V_{OUT}+1V, I_{OUT}=30mA (In case that $V_{OUT} \leq$1.5V, V_{IN}=2.5V)	-	60	-	dB

TYPICAL CHARACTERISTICS

1) Output Voltage vs. Input Voltage (C_{IN} = C_{OUT} = 0.47μF, T_{OPR} =25°C)

KIC3213MF12



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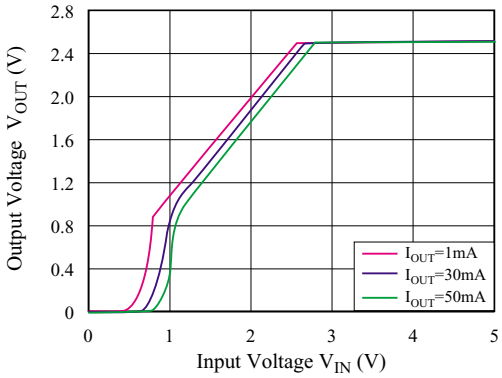

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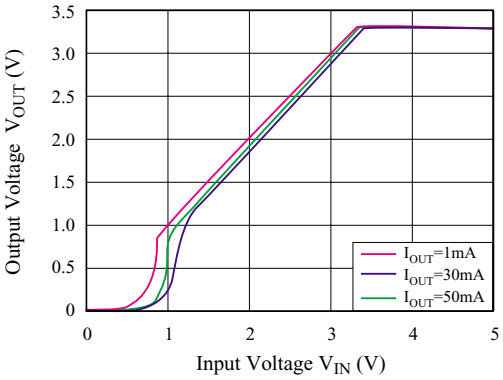
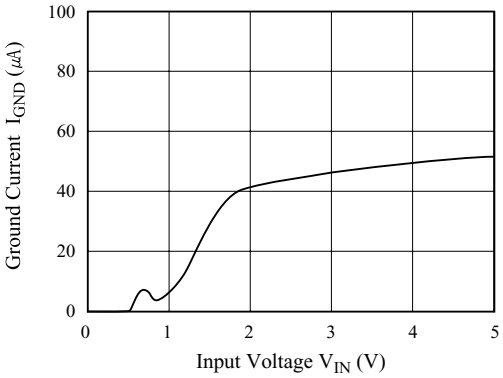


2) Ground Current vs. Input Voltage (C_{IN} = C_{OUT} = 0.47μF, T_{OPR} =25°C)

KIC3213MF12



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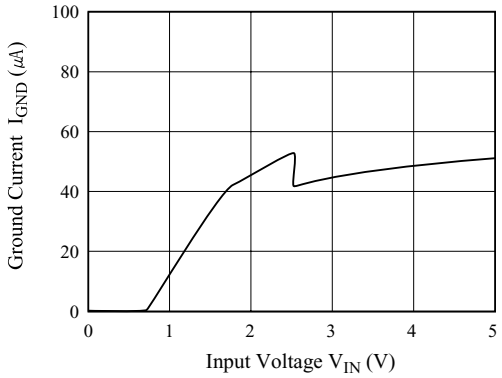

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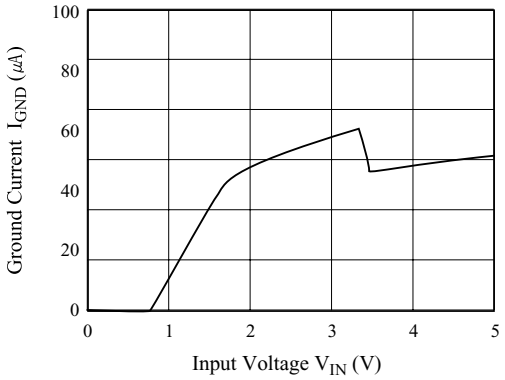

3) Output Voltage vs. Temperature
(C_{IN} = C_{OUT} = 0.47μF, I_{OUT} =1mA)

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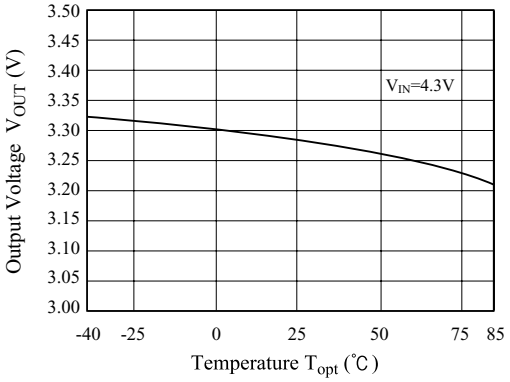

4) Ground Current vs. Temperature
(C_{IN} = C_{OUT} = 0.47μF, I_{OUT} =0A)

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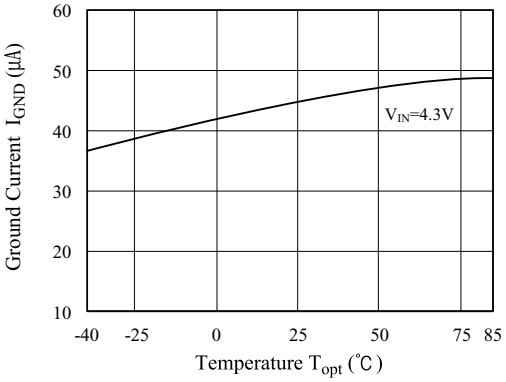

5) Input Transient Response
(I_{OUT} =30mA, tr =tf =5μs, T_{OPR}=25°C)

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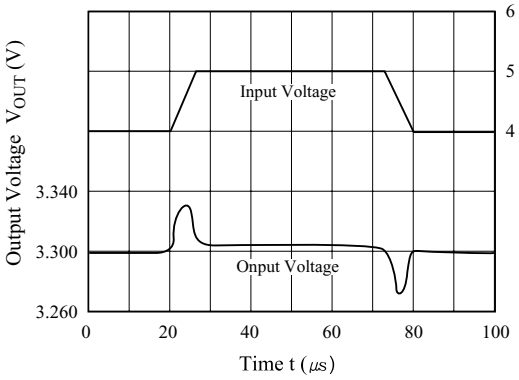

6) Load Transient Response
(C_{IN} = C_{OUT} = 0.47μF, T_{OPR} =25°C)

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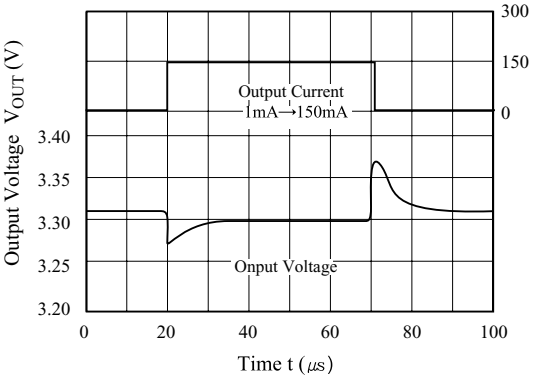

7) Turn On Speed With CE Pin (C_{IN} = C_{OUT} = 0.47μF, T_{OPR} =25°C)

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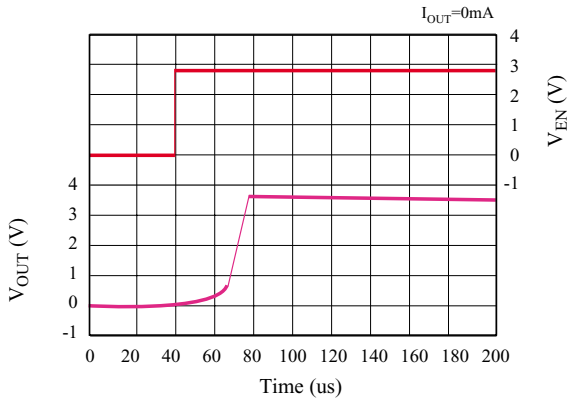

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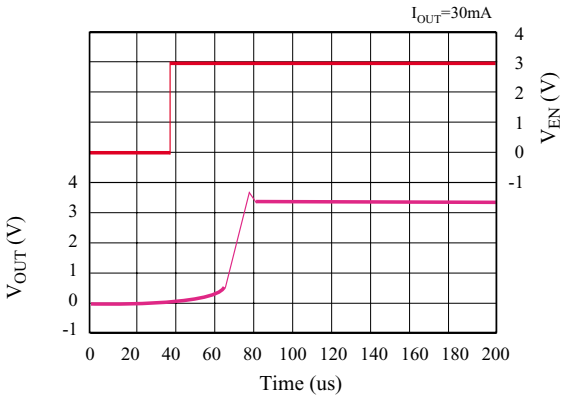

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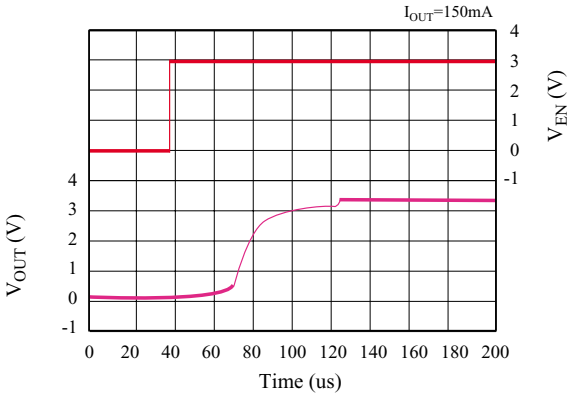

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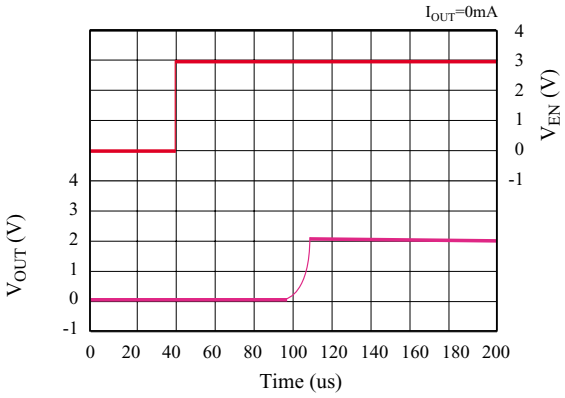

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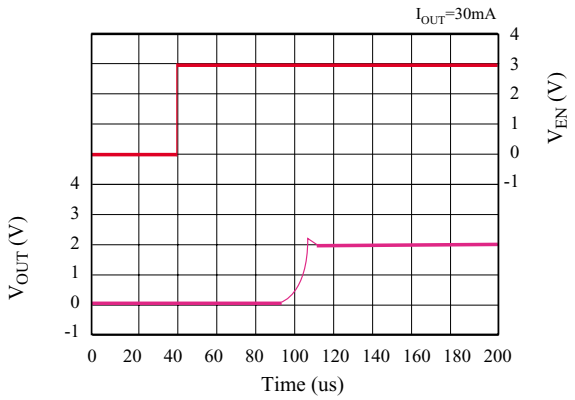

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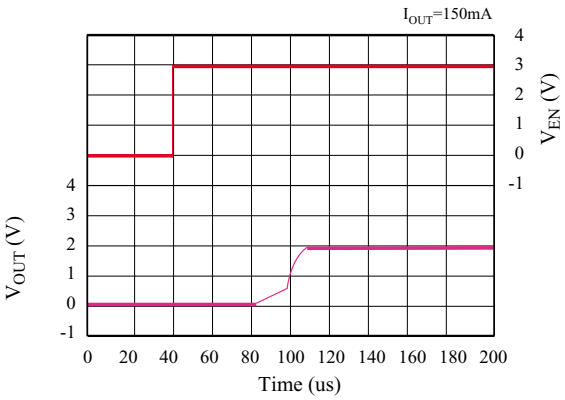

8) Turn Off Speed With CE Pin (C_{IN} = C_{OUT} = 0.47μF, T_{OPR} =25°C)

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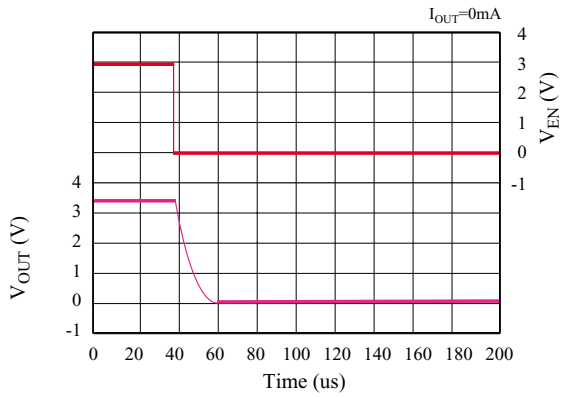

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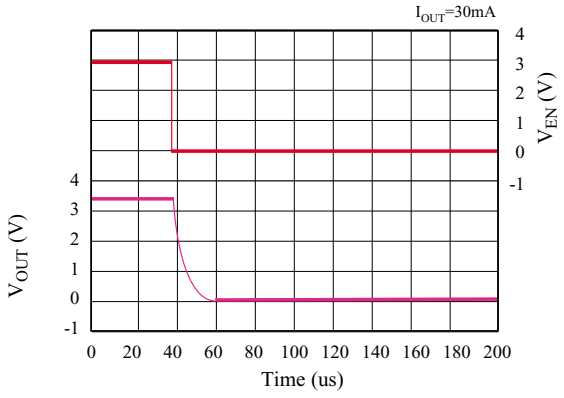

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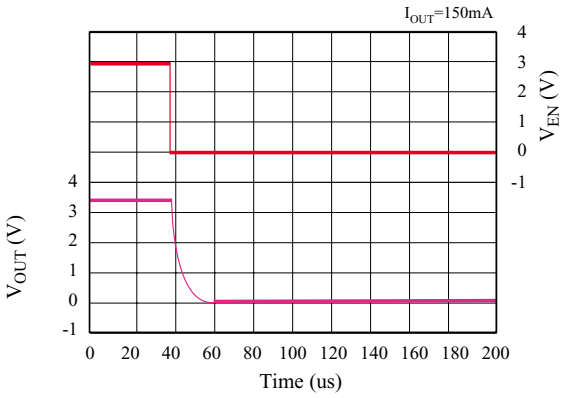

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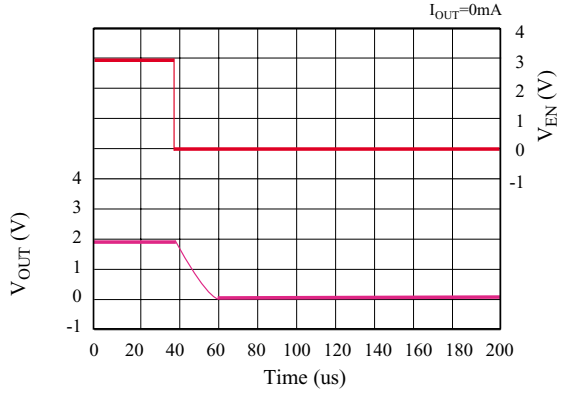

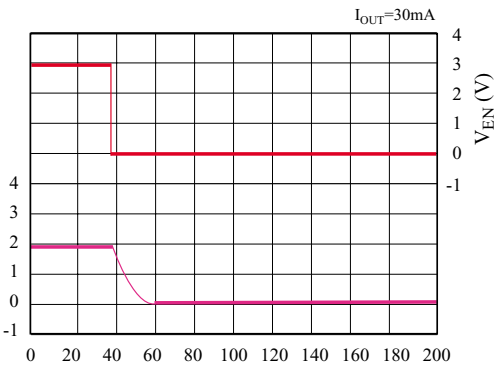

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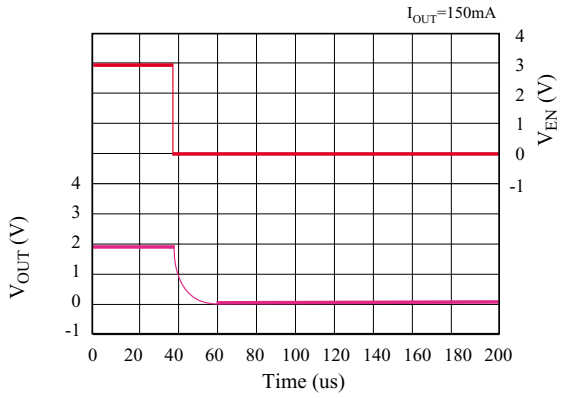

7) Ripple Rejection Vs Frequency (C_{IN}=none, C_{OUT}=0.47μF, V_{IN}=4.3V, Ripple=0.2V_{P-P}, I_{OUT}=100mA)

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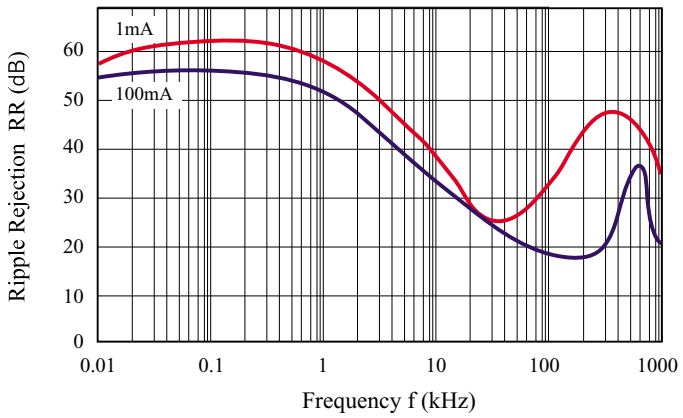
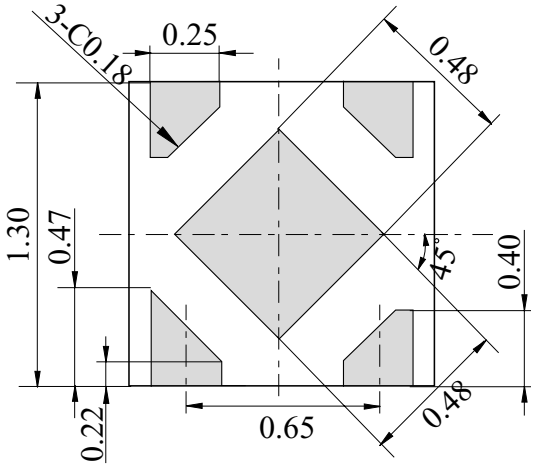


RECOMMENDED LAND PATTERN



(Unit : mm)