R1526x Series

AEC-Q100 Grade1

300 mA, 42 V Voltage Regulator with High Noise Immunity for Automotive Applications

No. EC-527-211022

OVERVIEW

The R1526x is a voltage regulator featuring 300mA output current and 42 V maximum input voltage.
Since this device has excellent noise immunity to external electromagnetic interference, it is suitable for use in environments where electromagnetic waves may cause malfunctions.

KEY BENEFITS

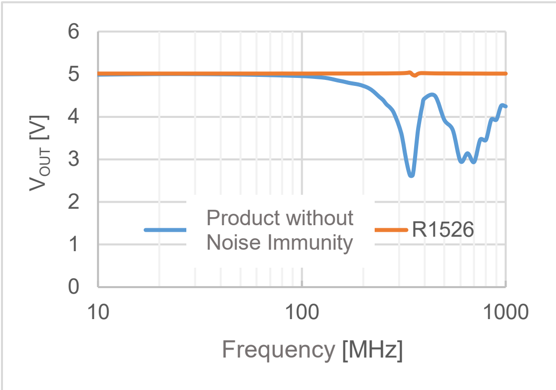
- Excellent noise immunity. Refer to *Noise Immunity Test* in Typical Characteristics.
- Pin configuration considering functional safety

KEY SPECIFICATIONS

- Input Voltage Range (Maximum Rating):
  3.5 V to 42 V (50 V)
- Operating temperature range: -40°C to 125°C
- Standby Current: Typ. 0.1 μA
- Dropout Voltage: Typ. 0.4 V (I_{OUT} = 300 mA, V_{SET} = 5.0 V)
- Output Voltage: 1.8 V to 9.0 V (in 0.1 V step)
- Output Voltage Accuracy: ±0.6 % (Ta = 25°C)
  ±1.6 % (-40°C ≤ Ta ≤ 125°C)
- Short-circuit Protection: Limit at Typ. 100 mA
- Overcurrent Protection: Limit at Typ. 450 mA
- Thermal Shutdown: Detection Temperature. Typ. 160°C
- Output capacitor: C_{OUT} ≥ 10 μF
- Ripple Rejection: Typ. 50 dB (f = 100 Hz)

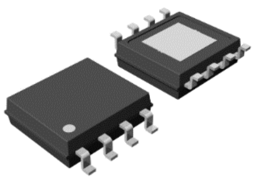
TYPICAL CHARACTERISTICS

Noise Immunity Test



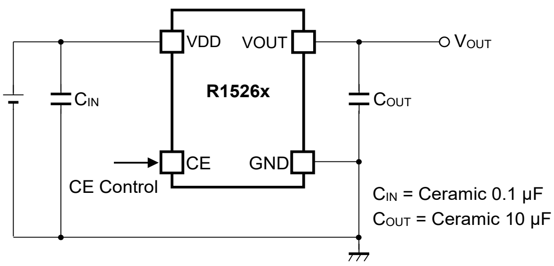
DPI method

PACKAGE



HSOP-8E
5.2 x 6.2 x 1.45 mm

TYPICAL APPLICATION



APPLICATIONS

- In-vehicle electrical equipment such as EPSECU, ADAS/autonomous driving system ECU, meter ECU, telematics ECU.

SELECTION GUIDE

The set output voltage and the quality class are user-selectable.

Selection Guide

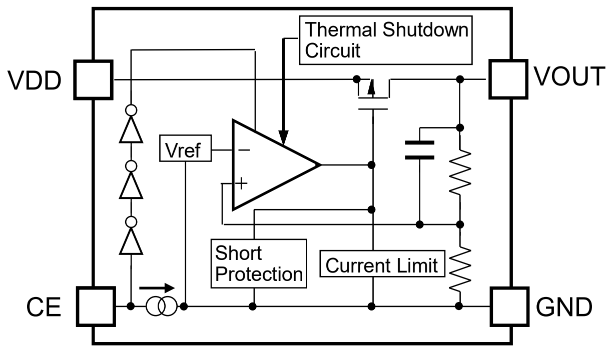
Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
R1526Sxx1B-E2-#E	HSOP-8E	1,000 pcs	Yes	Yes

xx: Specify the set output voltage (V_{SET})
1.8 V (18) to 9.0 V (90) in 0.1 V step
Refer to *Product-specific Electrical Characteristics* for details.

#: Quality Class

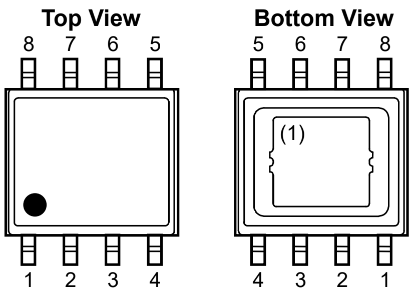
#	Operating Temperature Range	Test Temperature
A	−40°C to 125°C	25°C, High
K	−40°C to 125°C	Low, 25°C, High

BLOCK DIAGRAM



R1526x Block Diagram

PIN DESCRIPTIONS

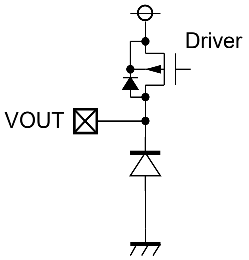


HSOP-8E Pin Configuration

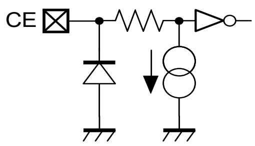
HSOP-8E Pin Descriptions

Pin No.	Pin Name	Description
1	VOUT	Output Pin
2	NC(2)	No Connection
3	NC(2)	No Connection
4	CE	Chip Enable Pin (Active-high)
5	GND(3)	Ground Pin
6	GND(3)	Ground Pin
7	NC(2)	No Connection
8	VDD	Input Pin

Pin Equivalent Circuit Diagrams



VOUT Pin Equivalent Circuit Diagram



CE Pin Equivalent Circuit Diagram

(1) The tab on the bottom of the package is substrate level (GND). The tab must be connected to the ground plane on the board.
(2) NC pin should be set to “Open”.
(3) GND pins should be connected together when mounted on a board.

ABSOLUTE MAXIMUM RATINGS

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{IN}	VIN Pin Input Voltage	−0.3 to 50	V
V_{IN}	VIN Pin Peak Voltage(1)	60	V
V_{CE}	CE Pin Input Voltage	−0.3 to 50	V
V_{CE}	CE Pin Peak Voltage (1)	60	V
V_{OUT}	VOUT Pin Voltage	−0.3 to V_{IN} + 0.3 ≤ 50	V
I_{OUT}	Output Current	500	mA
P_D	Power Dissipation	Refer to Appendix *"Power Dissipation"*	
Tj	Junction Temperature Range	−40 to 150	°C
Tstg	Storage Temperature Range	−55 to 150	°C

ABSOLUTE MAXIMUM RATINGS

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause permanent damage and may degrade the lifetime and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings is not assured.

RECOMMENDED OPERATING CONDITIONS

Recommended Operating Conditions

Symbol	Parameter	Rating	Unit
V_{IN}	Operating Input Voltage	3.5 to 42	V
Ta	Operating Temperature Range	−40 to 125	°C

RECOMMENDED OPERATING CONDITIONS

All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

(1) Duration time: within 200 ms

ELECTRICAL CHARACTERISTICS

V_{IN} = 14 V, V_{CE} = V_{IN}, unless otherwise specified.
The specifications surrounded by [box] are guaranteed by design engineering at −40°C ≤ Ta ≤ 125°C.

R1526x-AE Electrical Characteristics **(Ta = 25°C)**

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
I_{SS}	Supply Current	V_{IN} = 14 V, I_{OUT} = 0 mA			32	55	μA
Istandby	Standby Current	V_{IN} = 42 V, V_{CE} = 0 V			0.1	2.0	μA
V_{OUT}	Output Voltage	8 V[(1)] ≤ V_{IN} ≤ 16 V, I_{OUT} = 1 mA	Ta = 25°C	×0.994		×1.006	V
			−40°C ≤ Ta ≤ 125°C	×0.984		×1.016	
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation [(2)]	V_{IN} = V_{SET} + 2.0 V, 1 mA ≤ I_{OUT} ≤ 100 mA	1.8 V ≤ V_{SET} ≤ 2.8 V	-5		45	mV
			2.8 V < V_{SET} ≤ 5.4 V	-5		40	
			5.4 V < V_{SET} ≤ 9.0 V	-5		72	
		V_{IN} = V_{SET} + 2.0 V, 1 mA ≤ I_{OUT} ≤ 300 mA	1.8 V ≤ V_{SET} ≤ 2.8 V	-5		68	
			2.8 V < V_{SET} ≤ 5.4 V	-5		60	
			5.4 V < V_{SET} ≤ 9.0 V	-5		108	
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation [(3)]	V_{SET} +1V[(4)]≤ V_{IN}≤42V, I_{OUT} = 1 mA	1.8 V ≤ V_{SET} ≤ 2.8 V	-30		30	mV
			2.8 V < V_{SET} ≤ 9.0 V	-0.02		0.02	%/V
V_{DIF}	Dropout Voltage [(5)]	I_{OUT} = 300 mA	1.8 V ≤ V_{SET} ≤ 2.4 V		1.73	1.76	V
			2.4 V < V_{SET} ≤ 2.8 V		0.75	1.35	
			2.8 V < V_{SET} < 5.0 V		0.71	1.23	
			5.0 V ≤ V_{SET} < 8.0 V		0.40	0.74	
			8.0 V ≤ V_{SET} ≤ 9.0 V		0.35	0.65	
I_{LIM}	Output Current Limit	V_{IN} = V_{SET} + 3.0 V		300	450		mA
I_{SC}	Short-circuit Current	V_{IN} = 3.5 V, V_{OUT} = 0 V			100		mA
V_{CEH}	CE Pin Input Voltage, High			2.0		42	V
V_{CEL}	CE Pin Input Voltage, Low	V_{IN} = 42 V				1.0	V
I_{PD}	CE Pull-down Current	V_{IN} = 42 V, V_{CE} = 2 V			0.2	0.6	μA

All parameters are tested under the pulse load condition (Tj ≈ Ta = 25°C).

(1) When V_{SET} > 7 V, V_{IN} = V_{SET} + 1 V
(2) Output voltage change amount when 1 mA ≤ I_{OUT} ≤ 100 mA and 1 mA ≤ I_{OUT} ≤ 300 mA,
$\Delta V_{OUT}/\Delta I_{OUT}$ = V_{OUT} (@ I_{OUT} = 100 mA) - V_{OUT} (@ I_{OUT} = 1 mA) or
$\Delta V_{OUT}/\Delta I_{OUT}$ = V_{OUT} (@ I_{OUT} = 300 mA) - V_{OUT} (@ I_{OUT} = 1 mA)
(3) Output voltage change amount when V_{SET} +1V ≤ V_{IN} ≤ 42 V,
in case V_{SET} ≤ 2.8 V, $\Delta V_{OUT}/\Delta V_{IN}$ = V_{OUT} (@V_{IN} = 42 V) - V_{OUT} (@V_{IN} = V_{SET} + 1 V) or
in case V_{SET} > 2.8 V, $\Delta V_{OUT}/\Delta V_{IN}$ = (V_{OUT} (@V_{IN} = 42 V) - V_{OUT} (@V_{IN} = V_{SET} + 1 V)) / (42 – (V_{SET} + 1)) / V_{SET} x 100
(4) When V_{SET} ≤ 2.5 V, V_{IN} = 3.5 V.
(5) Dropout voltage is defined as the minimum value of the difference between the input and output voltages in order to supply a regulated output voltage with the specified load current.

V_{IN} = 14 V, V_{CE} = V_{IN}, unless otherwise specified.

R1526x-KE Electrical Characteristics **(−40°C ≤ Ta ≤ 125°C)**

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
I_{SS}	Supply Current	V_{IN} = 14 V, I_{OUT} = 0 mA			32	55	μA
Istandby	Standby Current	V_{IN} = 42 V, V_{CE} = 0 V			0.1	2.0	μA
V_{OUT}	Output Voltage	8 V[1] ≤ V_{IN} ≤ 16 V I_{OUT} = 1 mA	Ta = 25°C	×0.994		×1.006	V
			−40°C ≤ Ta ≤ 125°C	×0.984		×1.016	
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation [2]	V_{IN} = V_{SET} + 2.0 V, 1 mA ≤ I_{OUT} ≤ 100 mA	1.8 V ≤ V_{SET} ≤ 2.8 V	-5		45	mV
			2.8 V < V_{SET} ≤ 5.4 V	-5		40	
			5.4 V < V_{SET} ≤ 9.0 V	-5		72	
		V_{IN} = V_{SET} + 2.0 V, 1 mA ≤ I_{OUT} ≤ 300 mA	1.8 V ≤ V_{SET} ≤ 2.8 V	-5		68	
			2.8 V < V_{SET} ≤ 5.4 V	-5		60	
			5.4 V < V_{SET} ≤ 9.0 V	-5		108	
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation [3]	V_{SET} +1V[4] ≤ V_{IN}≤42V I_{OUT} = 1 mA	1.8 V ≤ V_{SET} ≤ 2.8 V	-30		30	mV
			2.8 V < V_{SET} ≤ 9.0 V	-0.02		0.02	%/V
V_{DIF}	Dropout Voltage [5]	I_{OUT} = 300 mA	1.8 V ≤ V_{SET} ≤ 2.4 V		1.73	1.76	V
			2.4 V < V_{SET} ≤ 2.8 V		0.75	1.35	
			2.8 V < V_{SET} < 5.0 V		0.71	1.23	
			5.0 V ≤ V_{SET} < 8.0 V		0.40	0.74	
			8.0 V ≤ V_{SET} ≤ 9.0 V		0.35	0.65	
I_{LIM}	Output Current Limit	V_{IN} = V_{SET} + 3.0 V		300	450		mA
I_{SC}	Short-circuit Current	V_{IN} = 3.5 V, V_{OUT} = 0 V			100		mA
V_{CEH}	CE Pin Input Voltage, High			2.0		42	V
V_{CEL}	CE Pin Input Voltage, Low	V_{IN} = 42 V		0		1.0	V
I_{PD}	CE Pull-down Current	V_{IN} = 42 V, V_{CE} = 2 V			0.2	0.6	μA

[1] When V_{SET} > 7 V, V_{IN} = V_{SET} + 1 V

[2] Output voltage change amount when 1 mA ≤ I_{OUT} ≤ 100 mA and 1 mA ≤ I_{OUT} ≤ 300 mA,
$\Delta V_{OUT}/\Delta I_{OUT}$ = V_{OUT} (@ I_{OUT} = 100 mA) - V_{OUT} (@ I_{OUT} = 1 mA) or
$\Delta V_{OUT}/\Delta I_{OUT}$ = V_{OUT} (@ I_{OUT} = 300 mA) - V_{OUT} (@ I_{OUT} = 1 mA)

[3] Output voltage change amount when V_{SET} +1V ≤ V_{IN} ≤ 42 V,
in case V_{SET} ≤ 2.8 V, $\Delta V_{OUT}/\Delta V_{IN}$ = V_{OUT} (@V_{IN} = 42 V) - V_{OUT} (@V_{IN} = V_{SET} + 1 V) or
in case V_{SET} > 2.8 V, $\Delta V_{OUT}/\Delta V_{IN}$ = (V_{OUT} (@V_{IN} = 42 V) - V_{OUT} (@V_{IN} = V_{SET} + 1 V)) / (42 – (V_{SET} + 1)) / V_{SET} x 100

[4] When V_{SET} ≤ 2.5 V, V_{IN} = 3.5 V.

[5] Dropout voltage is defined as the minimum value of the difference between the input and output voltages in order to supply a regulated output voltage with the specified load current.

The specifications surrounded by ☐ are guaranteed by design engineering at -40°C ≤ Ta ≤ 125°C.

R1526x (-AE) Product-specific Electrical Characteristics (Ta = 25°C)

Product name	V_{OUT} (V) (Ta = 25°C)			V_{OUT} (V) (−40°C ≤ Ta ≤ 125°C)			V_{DIF} (V)	
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	TYP.	MAX.
R1526S181B	1.7892	1.80	1.8108	1.7712	1.80	1.8288	1.73	1.76
R1526S251B	2.4850	2.50	2.5150	2.4600	2.50	2.5400	0.75	1.35
R1526S281B	2.7832	2.80	2.8168	2.7552	2.80	2.8448		
R1526S301B	2.9820	3.00	3.0180	2.9520	3.00	3.0480		
R1526S331B	3.2802	3.30	3.3198	3.2472	3.30	3.3528	0.71	1.23
R1526S341B	3.3796	3.40	3.4204	3.3456	3.40	3.4544		
R1526S501B	4.9700	5.00	5.0300	4.9200	5.00	5.0800		
R1526S551B	5.4670	5.50	5.5330	5.4120	5.50	5.5880		
R1526S601B	5.9640	6.00	6.0360	5.9040	6.00	6.0960	0.40	0.74
R1526S641B	6.3616	6.40	6.4384	6.2976	6.40	6.5024		
R1526S751B	7.4550	7.50	7.5450	7.3800	7.50	7.6200		
R1526S801B	7.9520	8.00	8.0480	7.8720	8.00	8.1280		
R1526S851B	8.4490	8.50	8.5510	8.3640	8.50	8.6360	0.35	0.65
R1526S901B	8.9460	9.00	9.0540	8.8560	9.00	9.1440		

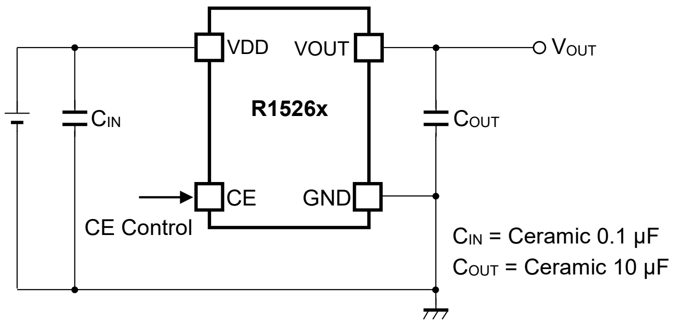
Product name	$\Delta V_{OUT}/\Delta I_{OUT}$ (mV) (1 mA ≤ I_{OUT} ≤ 100 mA)		$\Delta V_{OUT}/\Delta I_{OUT}$ (mV) (1 mA ≤ I_{OUT} ≤ 300 mA)		$\Delta V_{OUT}/\Delta V_{IN}$	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
R1526S181B						
R1526S251B	-5	45	-5	68	-30 (mV)	30 (mV)
R1526S281B						
R1526S301B						
R1526S331B	-5	40	-5	60		
R1526S341B						
R1526S501B						
R1526S551B					-0.02 (%/V)	0.02 (%/V)
R1526S601B						
R1526S641B						
R1526S751B	-5	72	-5	108		
R1526S801B						
R1526S851B						
R1526S901B						

R1526x (-KE) Product-specific Electrical Characteristics (−40°C ≤ Ta ≤ 125°C)

Product name	V_{OUT} (V) (Ta = 25°C)			V_{OUT} (V) (−40°C ≤ Ta ≤ 125°C)			V_{DIF} (V)	
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	TYP.	MAX.
R1526S181B	1.7892	1.80	1.8108	1.7712	1.80	1.8288	1.73	1.76
R1526S251B	2.4850	2.50	2.5150	2.4600	2.50	2.5400	0.75	1.35
R1526S281B	2.7832	2.80	2.8168	2.7552	2.80	2.8448		
R1526S301B	2.9820	3.00	3.0180	2.9520	3.00	3.0480	0.71	1.23
R1526S331B	3.2802	3.30	3.3198	3.2472	3.30	3.3528		
R1526S341B	3.3796	3.40	3.4204	3.3456	3.40	3.4544		
R1526S501B	4.9700	5.00	5.0300	4.9200	5.00	5.0800	0.40	0.74
R1526S551B	5.4670	5.50	5.5330	5.4120	5.50	5.5880		
R1526S601B	5.9640	6.00	6.0360	5.9040	6.00	6.0960		
R1526S641B	6.3616	6.40	6.4384	6.2976	6.40	6.5024		
R1526S751B	7.4550	7.50	7.5450	7.3800	7.50	7.6200		
R1526S801B	7.9520	8.00	8.0480	7.8720	8.00	8.1280	0.35	0.65
R1526S851B	8.4490	8.50	8.5510	8.3640	8.50	8.6360		
R1526S901B	8.9460	9.00	9.0540	8.8560	9.00	9.1440		

Product name	$\Delta V_{OUT}/\Delta I_{OUT}$ (mV) (1 mA ≤ I_{OUT} ≤ 100 mA)		$\Delta V_{OUT}/\Delta I_{OUT}$ (mV) (1 mA ≤ I_{OUT} ≤ 300 mA)		$\Delta V_{OUT}/\Delta V_{IN}$	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
R1526S181B	-5	45	-5	68	-30 (mV)	30 (mV)
R1526S251B						
R1526S281B						
R1526S301B	-5	40	-5	60	-0.02 (%/V)	0.02 (%/V)
R1526S331B						
R1526S341B						
R1526S501B						
R1526S551B	-5	72	-5	108		
R1526S601B						
R1526S641B						
R1526S751B						
R1526S801B						
R1526S851B						
R1526S901B						

TYPICAL APPLICATION CIRCUIT



R1526x Typical Application Circuit

Component examples

Symbol	Capacitance	Tolerance	Voltage resistance	Temperature characteristics
C_{IN}	0.1 µF	±10%	50 V	X7R
C_{OUT}	10 µF	±10%	50 V	X7S

THEORY OF OPERATION

Thermal Shutdown Function

When the junction temperature exceeds the thermal shutdown detection temperature (Typ.160°C), R1526x goes into standby state and suppresses its self-heating. When the junction temperature falls below the thermal shutdown release temperature (Typ.135°C), this device becomes active.

Chip Enable Function

By inputting "High" and "Low" to the CE pin, R1526x can be set to active or standby state. The CE pin is pulled down with a constant current of Typ. 0.2 μA inside the IC. If the chip enable function is not needed, connect the CE pin directly to the VDD pin. R1526x can apply a voltage to the CE pin even when no voltage is applied to VDD pin.

TECHNICAL NOTES

The performance of a power source circuit using this device is highly dependent on a peripheral circuit. A peripheral component or the device mounted on PCB should not exceed a rated voltage, a rated current or a rated power. When designing a peripheral circuit, please be fully aware of the following points.

Phase Compensation

R1526x uses the output capacitor capacitance and equivalent series resistance (ESR) for phase compensation, to secure stable operation even when the load current is varied. For this purpose, make sure to use an output capacitor (C_{OUT}) of 10 μF or more as close as possible to the VOUT pin. Since the output may oscillate depending on the ESR, select a low ESR capacitor with reference to *the series equivalent resistance vs. output current* characteristics in the datasheet. In addition, Make the power supply and GND lines sufficient.
Connect a capacitor (C_{IN}) of 0.1 μF or more between the VDD pin and GND, and keep the wiring as short as possible.

Behavior below the minimum operating voltage

When V_{SET} ≤ 2.8 V and the power supply voltage is below the recommended operating voltage, the output voltage may become unstable and exceed the set output voltage of LDO. To avoid this behavior at power-on, turn on the voltage of both VDD and CE pins at a slew rate of 35 V/ms or more when both pins are turned on at the same time. When turning on the VDD pin at a slew rate of 35 V/ms or less, change the CE pin from “Low” to “High” after the power supply voltage exceeds 3.5 V.
To avoid this behavior at power-off, turn off the voltage of both VDD and CE pins at a steeper slew rate than -35 V/ms when both pins are turned off at the same time.
When turning off the VDD pin at a slower slew rate than -35 V/ms, change the CE pin from “High” to “Low” before the power supply voltage falls below 3.5 V.

Thermal Shutdown Function

The thermal shutdown function prevents the IC from fuming and ignition but does not ensure the IC’s reliability or keep the IC below the absolute maximum ratings. The thermal shutdown function does not operate on the heat generated by other than the normal IC operation such as latch-up and overvoltage application.

The thermal shutdown function operates in a state over the absolute maximum ratings, therefore the thermal shutdown function should not be used for a system design.

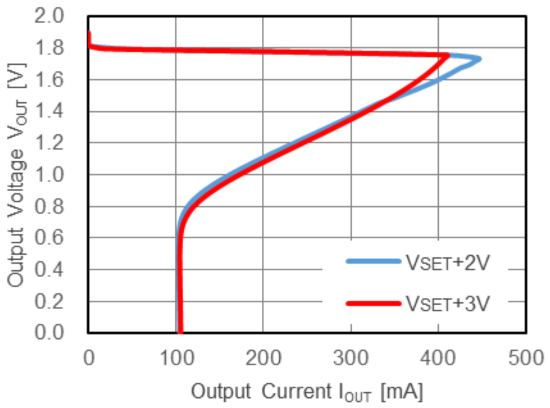
TYPICAL CHARACTERISTICS

Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

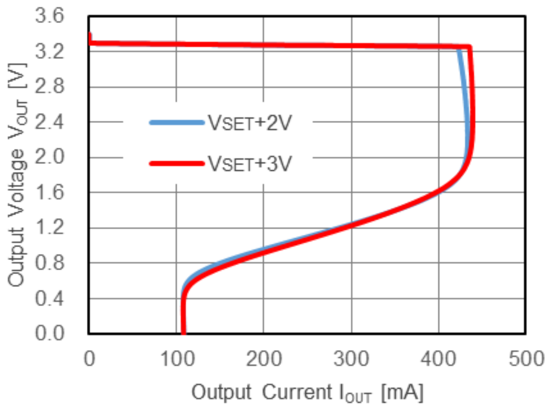
1) Output Voltage vs. Output Current

C_{IN} = none, C_{OUT} = 10μF, Ta = 25°C

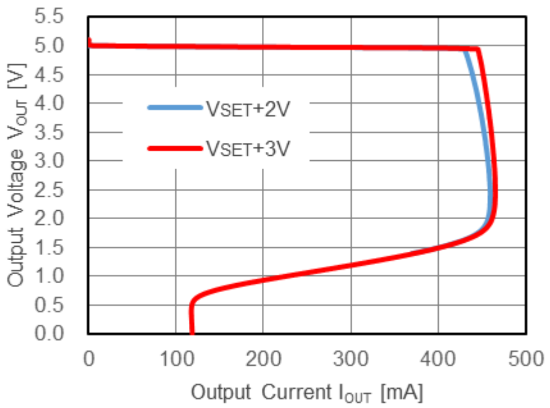
R1526S181B



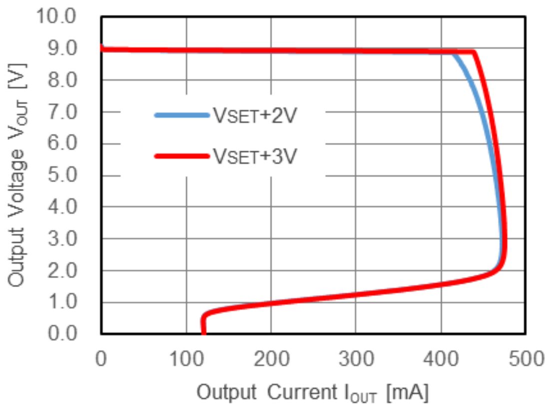
R1526S331B



R1526S501B



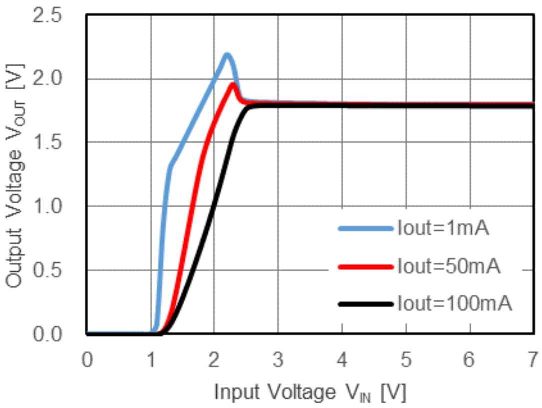
R1526S901B



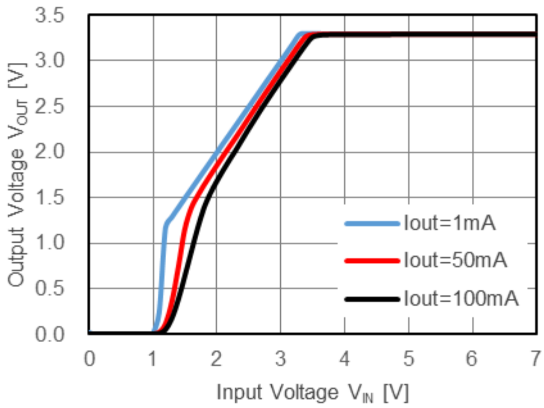
2) Output Voltage vs. Input Voltage

C_{IN} = none, C_{OUT} = 10µF, Ta = 25°C

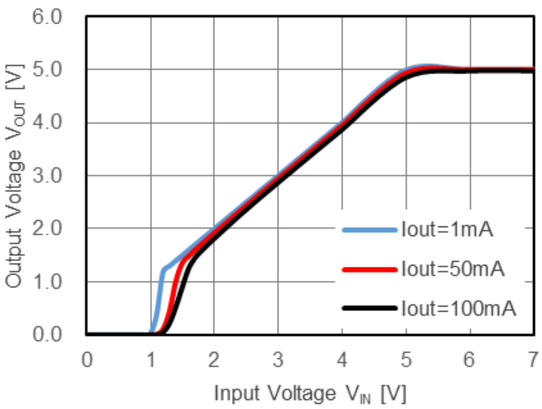
R1526S181B



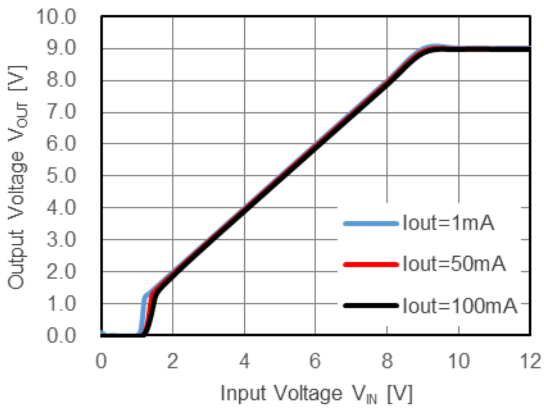
R1526S331B



R1526S501B



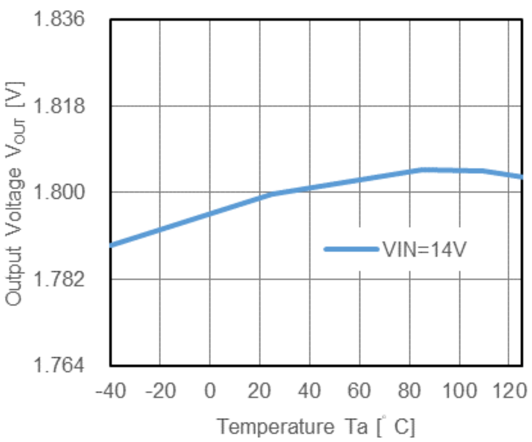
R1526S901B



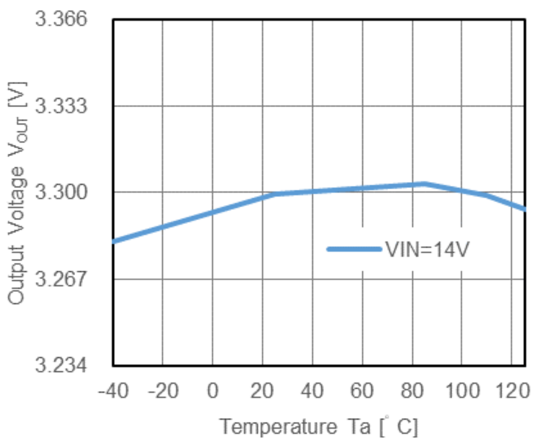
3) Output Voltage vs. Temperature

I_{OUT} = 1mA, C_{IN} = none, C_{OUT} = 10µF

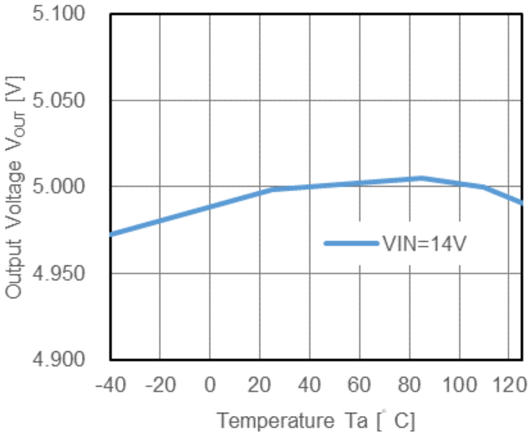
R1526S181B



R1526S331B



R1526S501B



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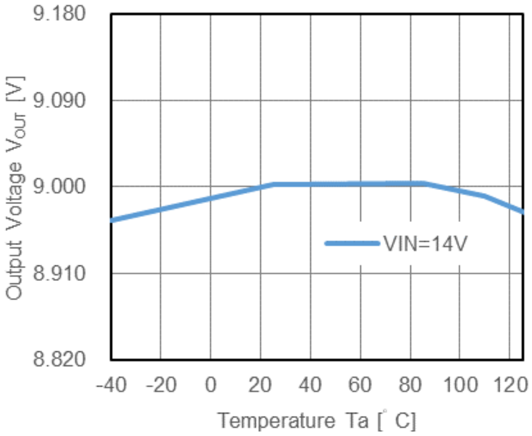
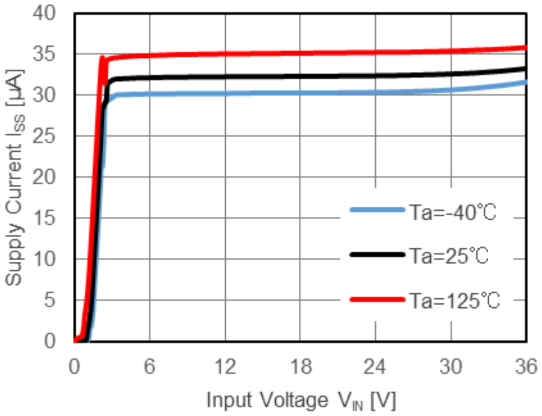


4) Supply Current vs. Input Voltage

C_{IN} = none, C_{OUT} = 10μF

R1526S181B



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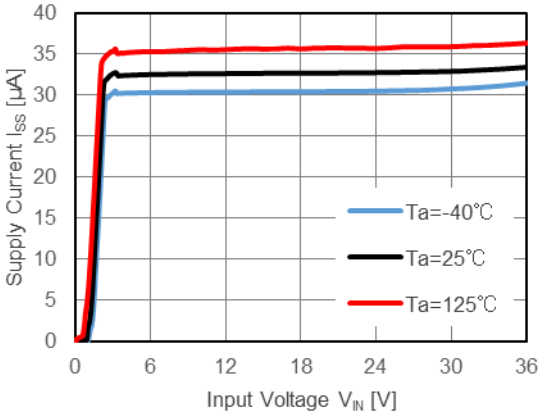
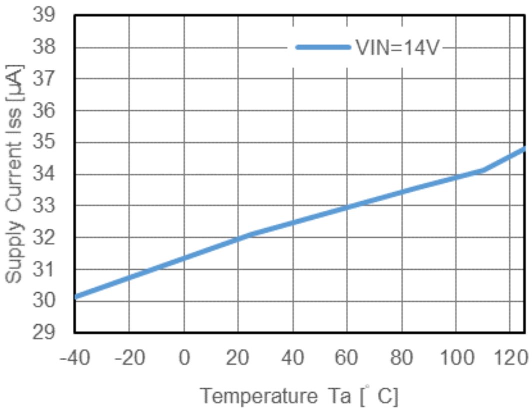


5) Supply Current vs. Temperature

C_{IN} = none, C_{OUT} = 10μF

R1526S181B



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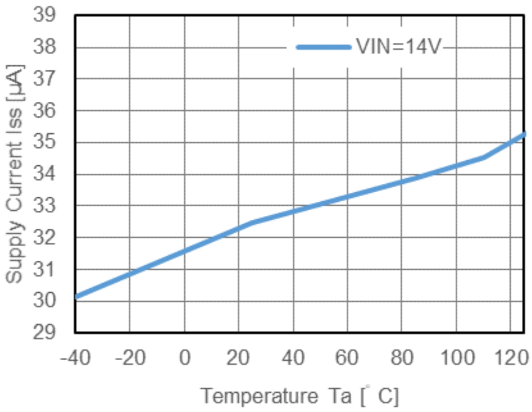

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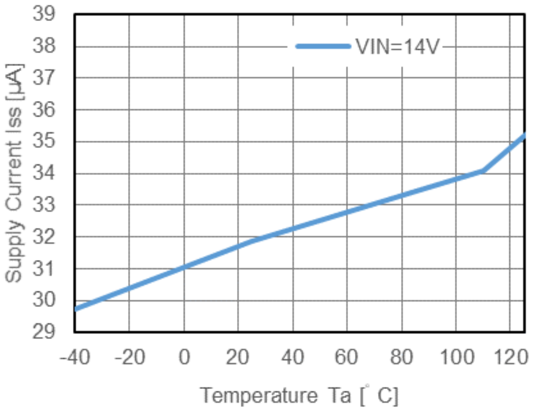

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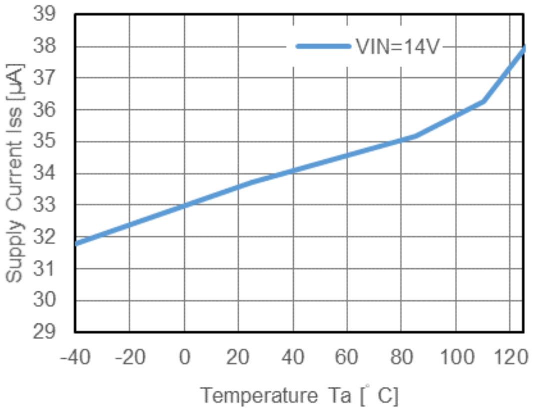
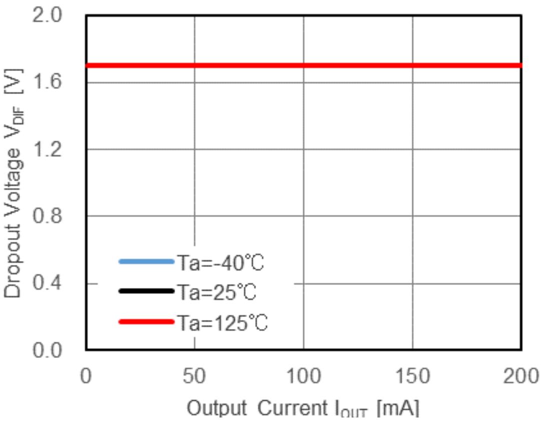


6) Dropout Voltage vs. Output Current

C_{IN} = none, C_{OUT} = 10μF

R1526S181B



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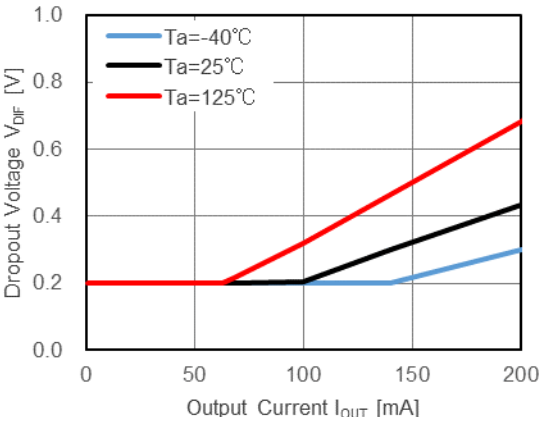

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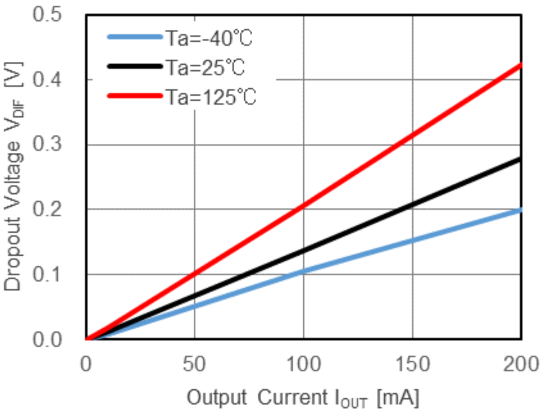

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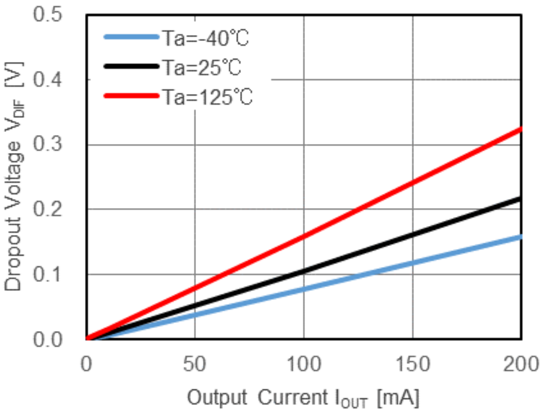
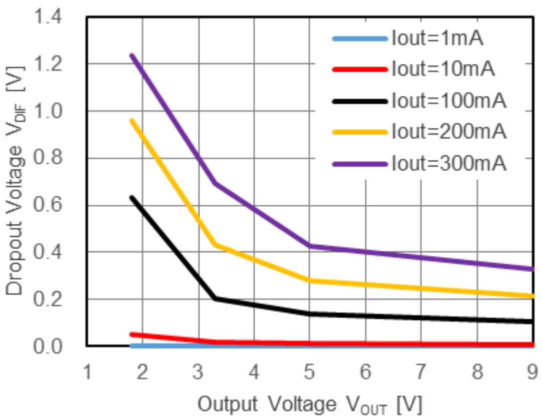


7) Dropout Voltage vs. Output Voltage

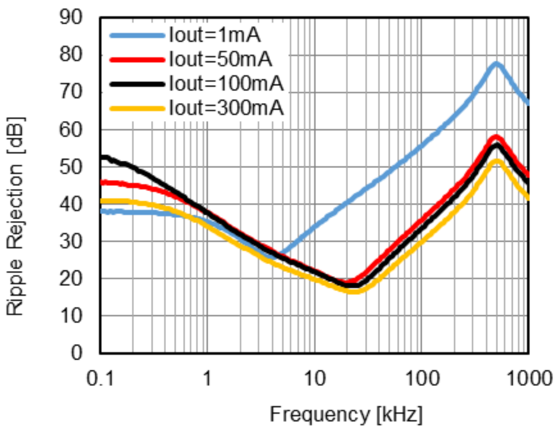
C_{IN} = none, C = 10µF, Ta = 25°C



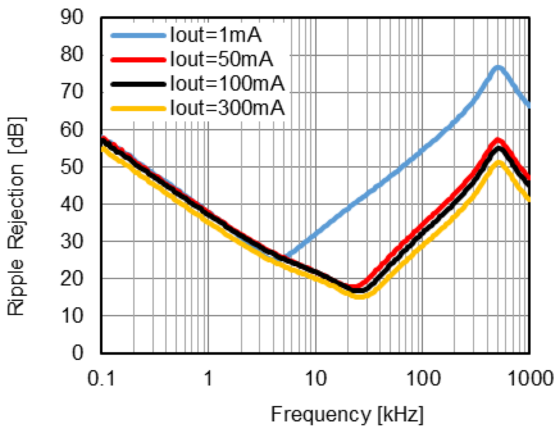
8) Ripple Rejection vs. Frequency

V_{IN} = V_{SET}+2V, Ripple = 0.2Vpp, C_{IN} = none, C_{OUT} = 10µF, Ta = 25°C

R1526S181B



R1526S331B



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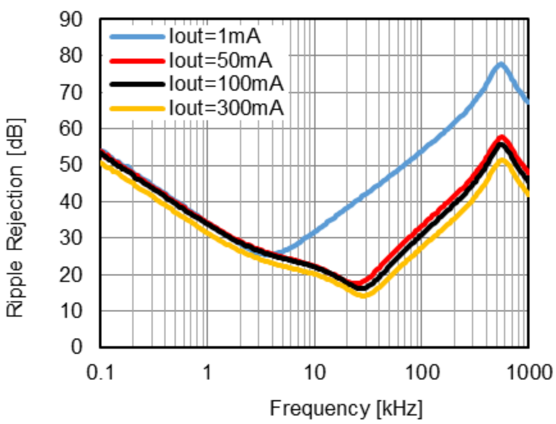

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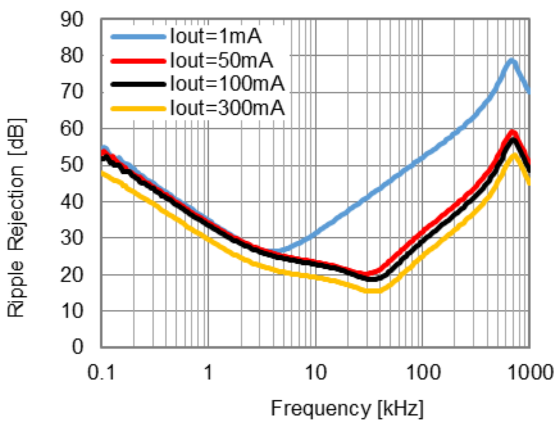
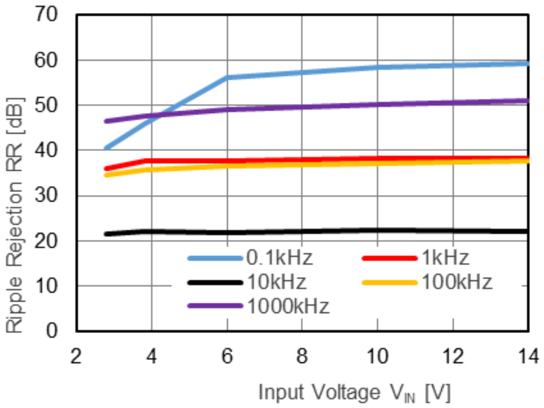


9) Ripple Rejection vs. Input Voltage

Ripple = 0.2Vpp, I_{OUT} = 50mA, C_{IN} = none, C_{OUT} = 10μF, Ta = 25°C

R1526S181B



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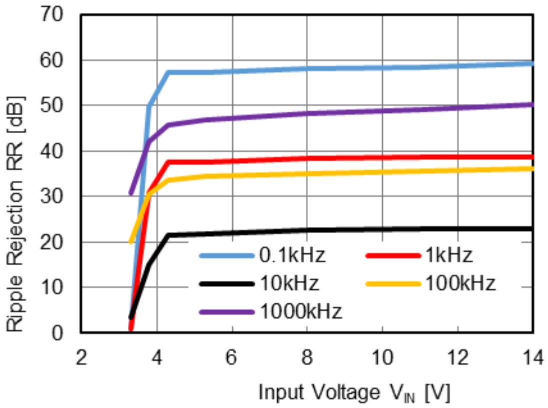

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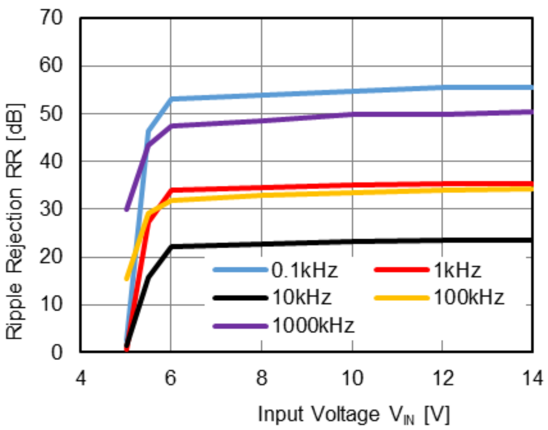

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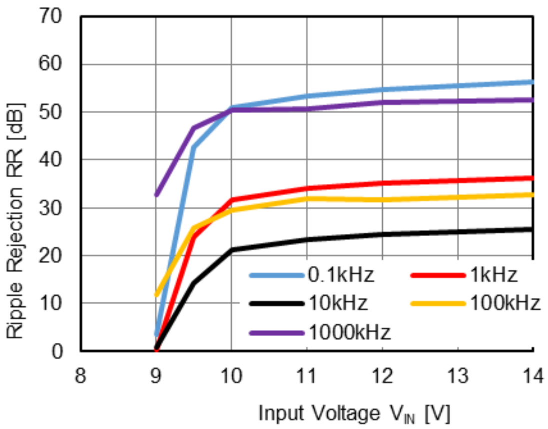
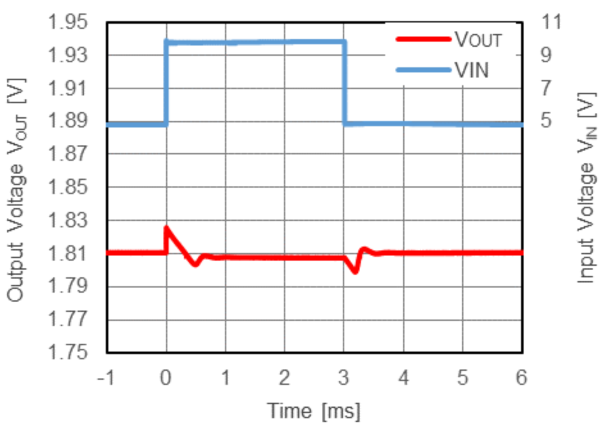


10) Input Transient Response

I_{OUT} = 1mA, C_{IN} = none, C_{OUT} = 10μF, Ta = 25°C, tr = tf = 1μs

R1526S181B



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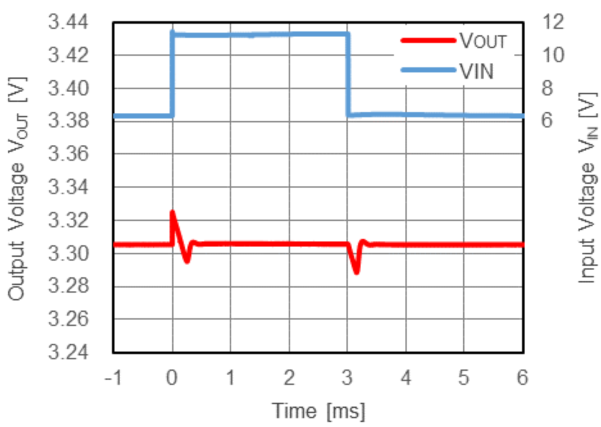
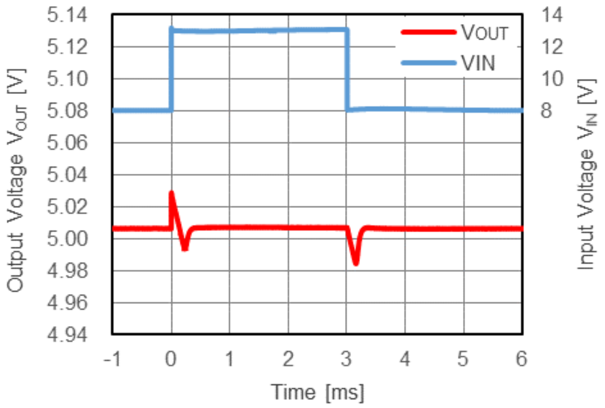
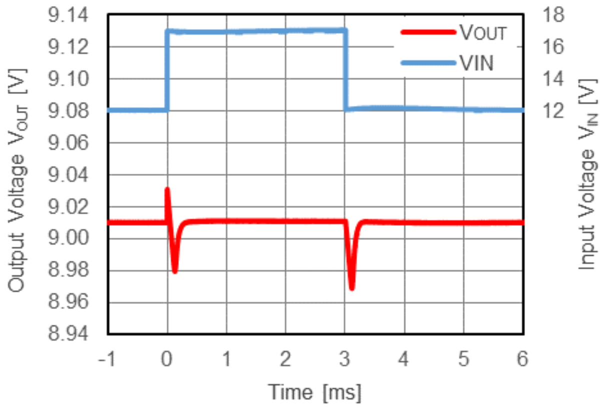


R1526S501B



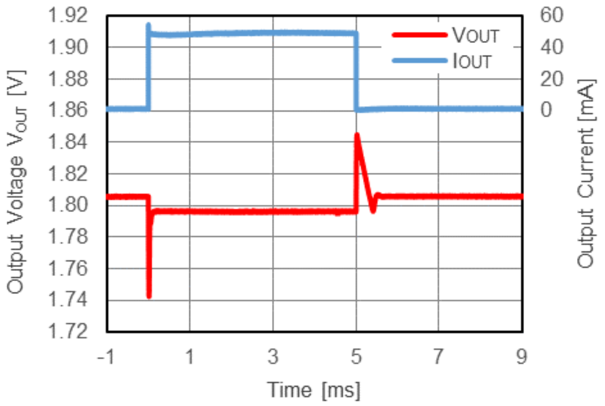
R1526S901B



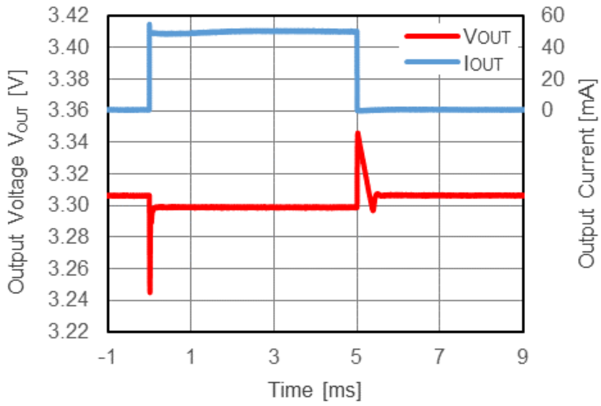
11) Load Transient Response

V_{IN} = 14V, C_{IN} = 0.1µF, C_{OUT} = 10µF, Ta = 25°C, tr = tf = 0.5µs

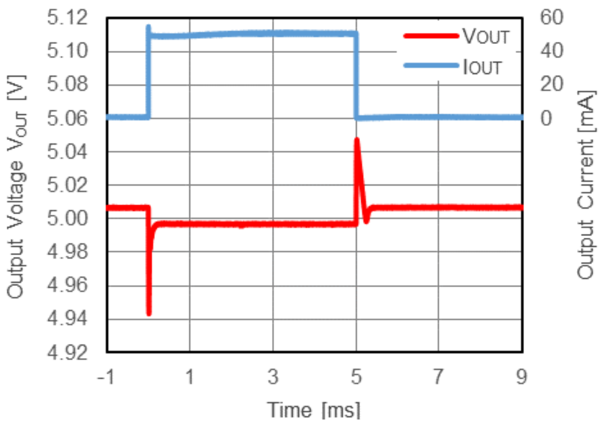
R1526S181B



R1526S331B



R1526S501B



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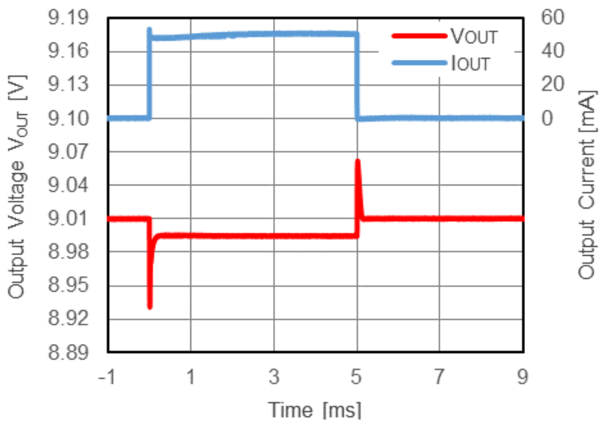
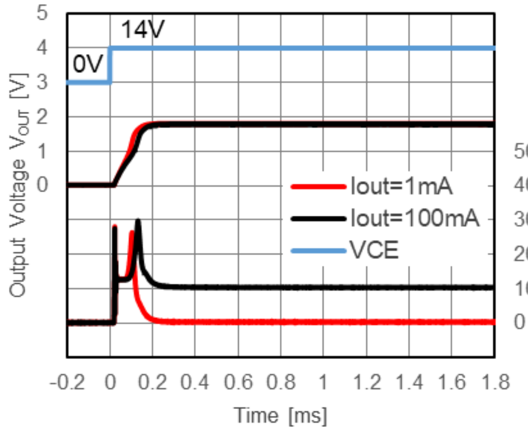
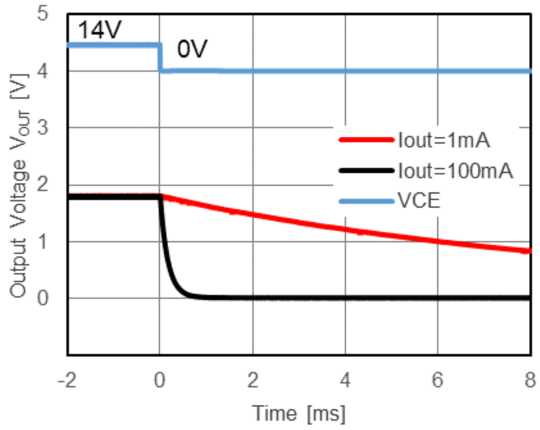


12) CE Transient Response

V_{IN} = 14V, V_{CE} = 0V → 14V, C_{IN} = 0.1μF, C_{OUT} = 10μF, Ta = 25°C, tr = tf = 1μs

R1526S181B





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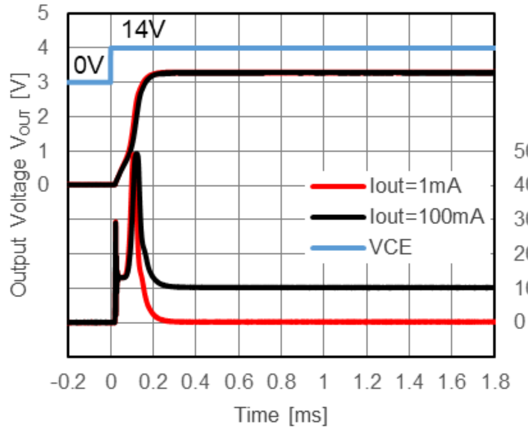
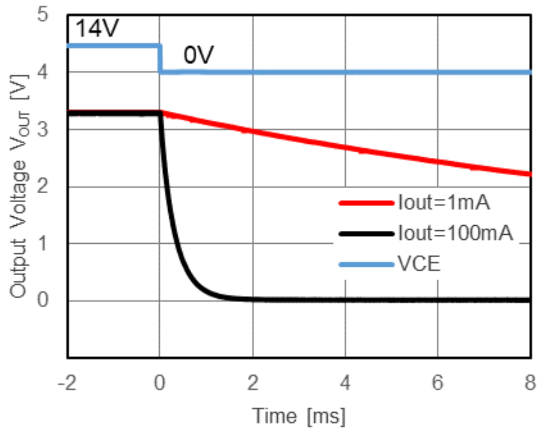
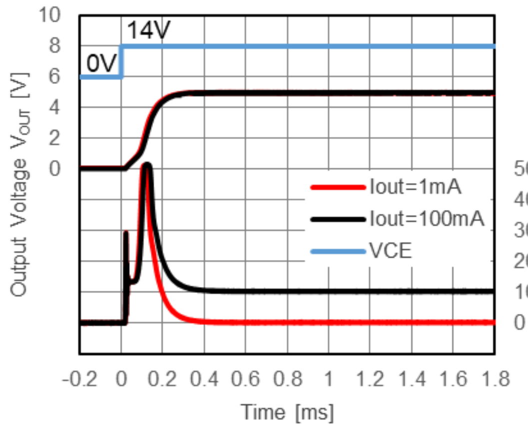
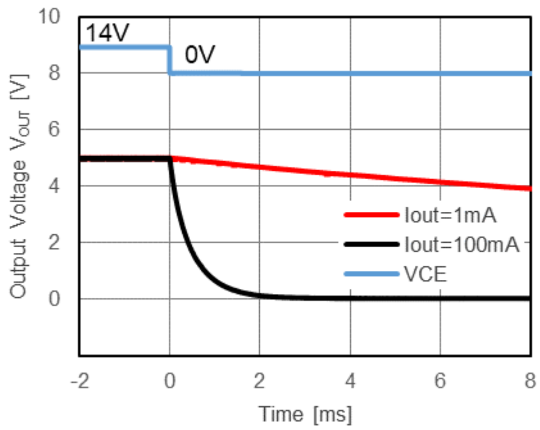


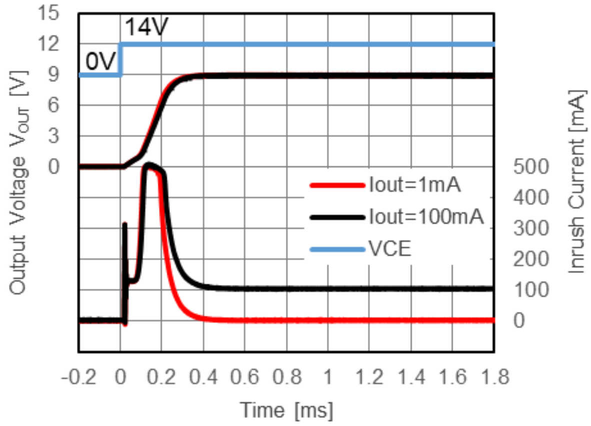


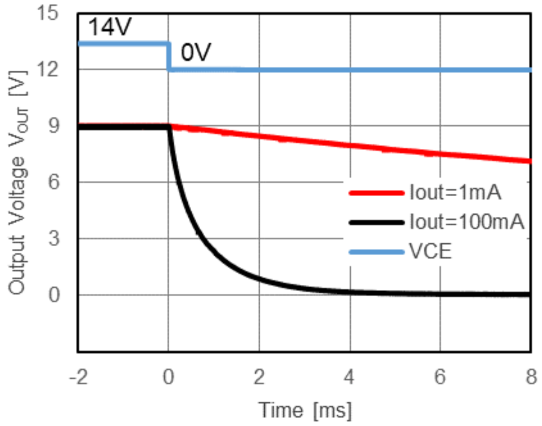
R1526S501B





R1526S901B

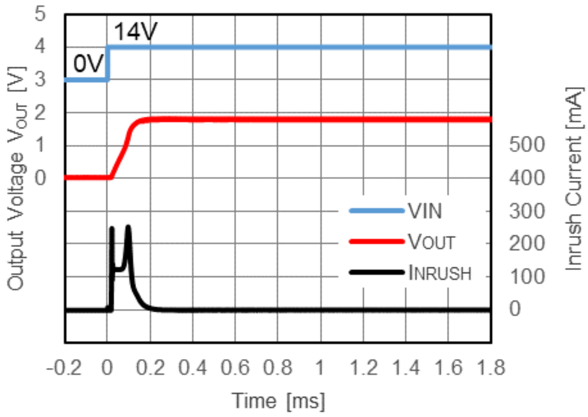




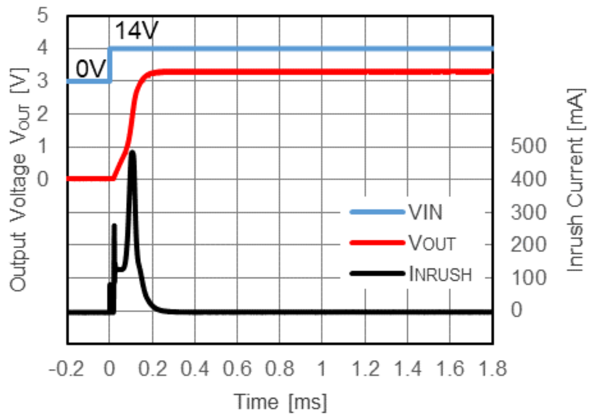
13) Power-on Transient Response

I_{OUT} = 1mA, C_{IN} = none, C_{OUT} = 10µF, Ta = 25°C, tr = 1µs

R1526S181B



R1526S331B



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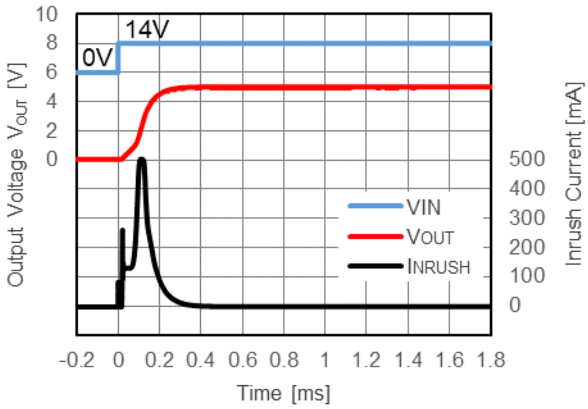
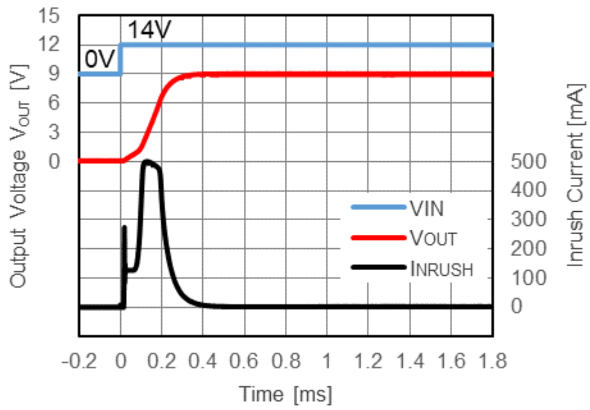


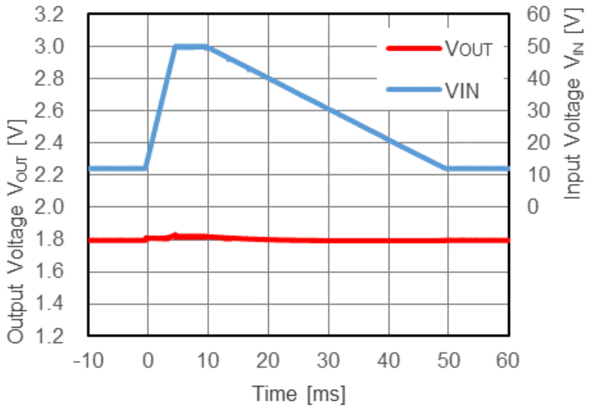
R1526S901B



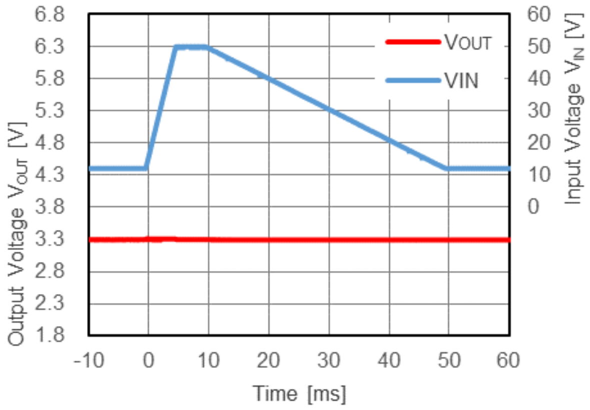
14) Load Dump

I_{OUT} = 50mA, C_{IN} = 0.1µF, C_{OUT} = 10µF, Ta = 25°C

R1526S181B



R1526S331B



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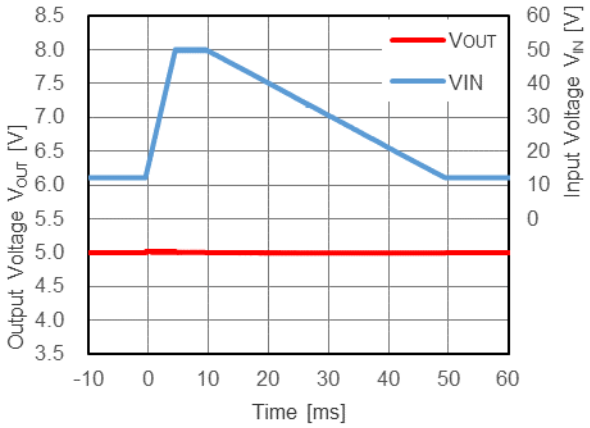
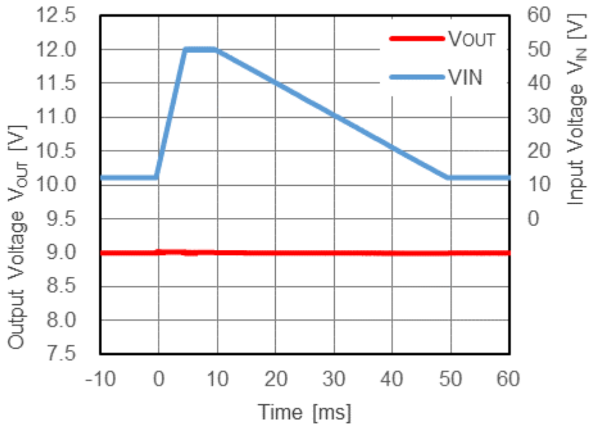


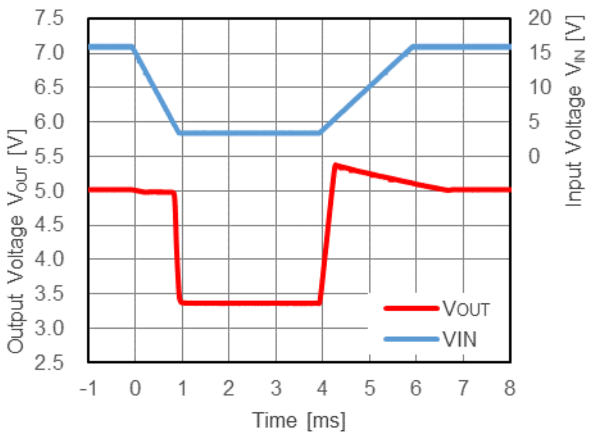
R1526S901B



15) Cold Crank

I_{OUT} = 1mA, C_{IN} = 0.1µF, C_{OUT} = 10µF, Ta = 25°C

R1526S501B



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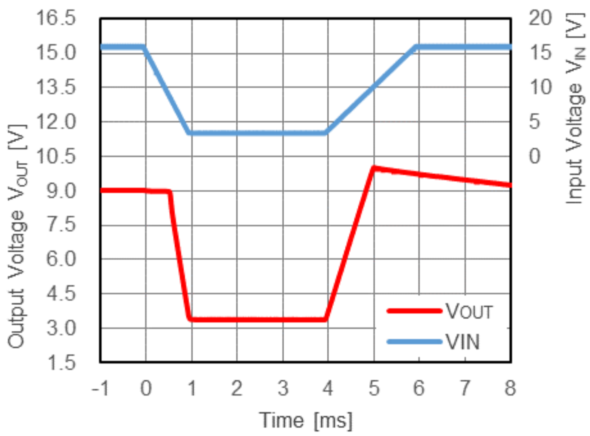
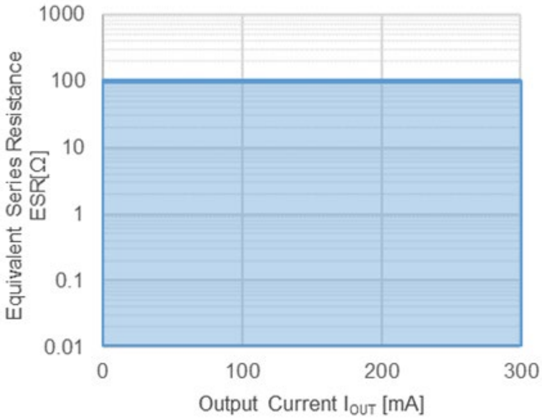


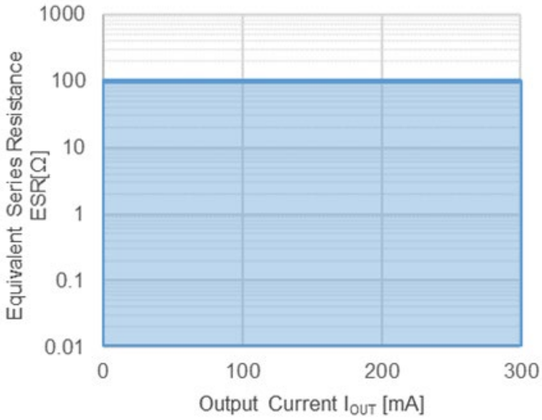
16) ESR (Equivalent Series Resistance)

C_{IN} = 0.1μF, C_{OUT} = 10μF, Ta = -40°C, 25°C, 125°C

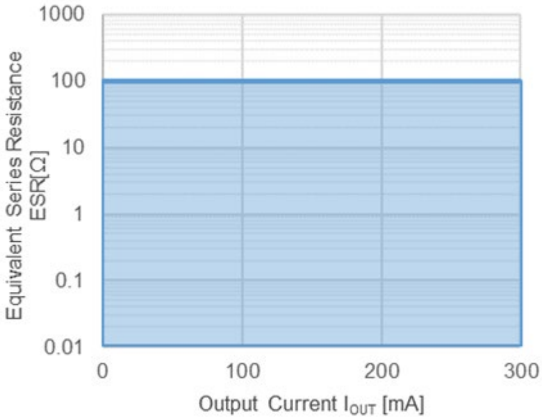
R1526S181B



R1526S331B



R1526S501B



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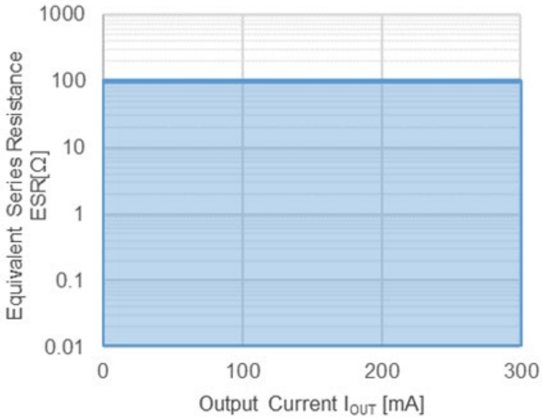
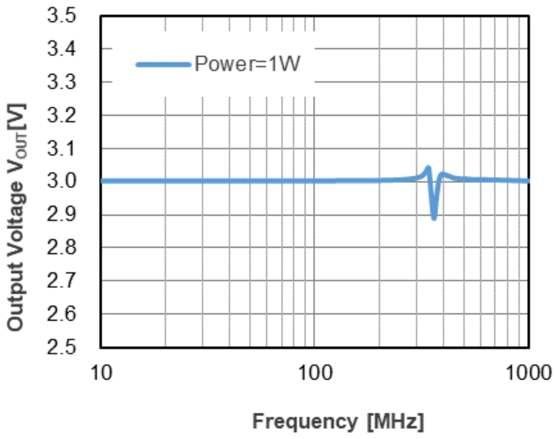


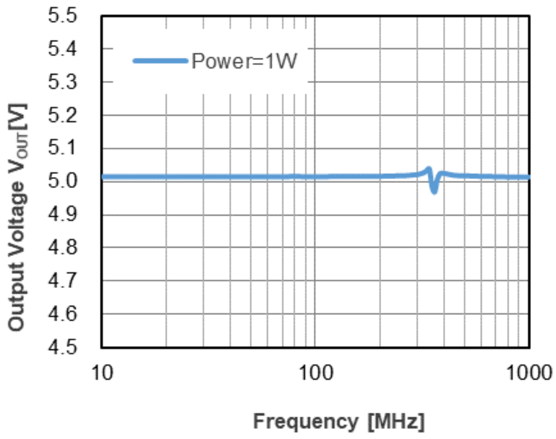
17) Noise Immunity

DPI method, V_{IN} = 14V, V_{CE} = 3V, V_{OUT} = 1W, C_{IN} = C_{CE} = 0.1μF, C_{OUT} = 10μF, Ta = 25°C

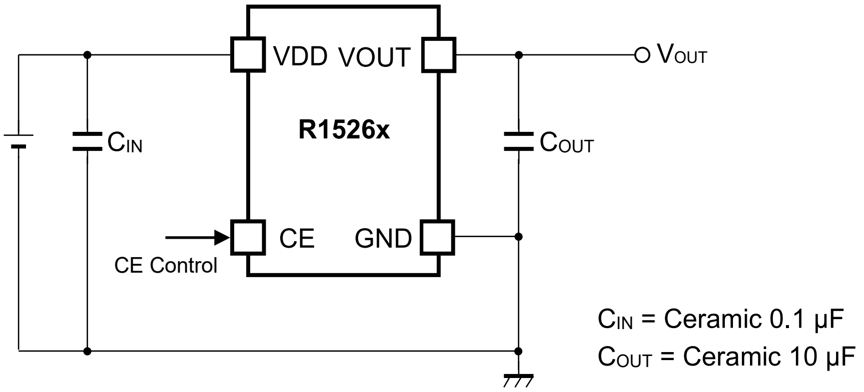
R1526S301B



R1526S501B



Test Circuit



Test Circuit for Typical Characteristics

Measurement Components

Symbol	Specification	Measurement Item	Manufacturer	Parts Number
C_{IN}	0.1µF	11,12,14,15,16,17	TDK	CGA4J2X7R1H104K
C_{OUT}	10µF	All Items	TDK	CGA4J1X7S1C106K

Measurement Components of Typical Characteristics

PD-HSOP-8E-(125150)-JE-B

The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following measurement conditions are based on JEDEC STD. 51-7.

Measurement Conditions

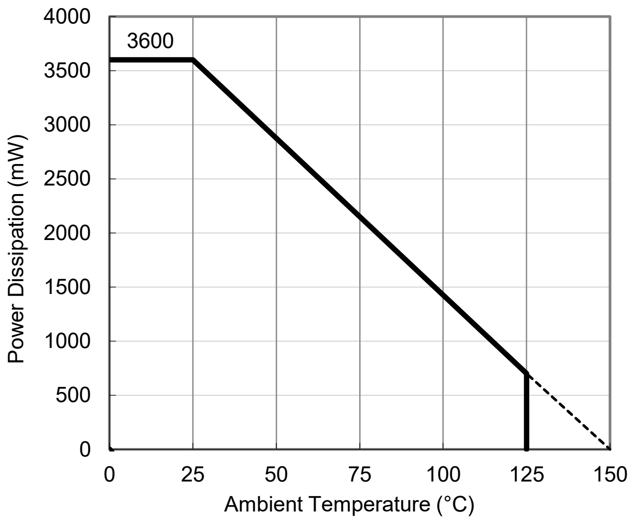
Item	Measurement Conditions
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-Layer Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm
Copper Ratio	Outer Layer (First Layer): Less than 95% of 50 mm Square Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square
Through-holes	ϕ 0.3 mm × 21 pcs

Measurement Result (Ta = 25°C, Tjmax = 150°C)

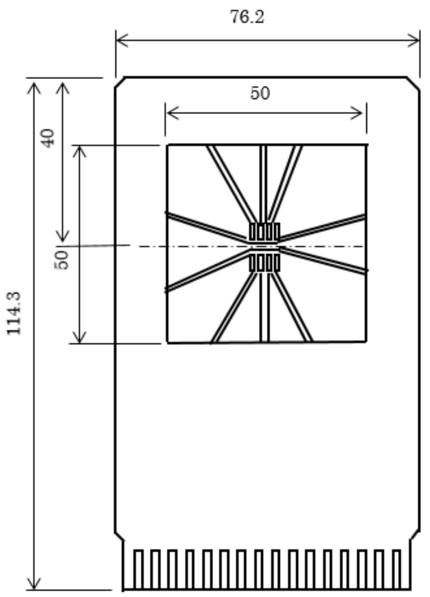
Item	Measurement Result
Power Dissipation	3600 mW
Thermal Resistance (θja)	θja = 34.5°C/W
Thermal Characterization Parameter (ψjt)	ψjt = 10°C/W

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter

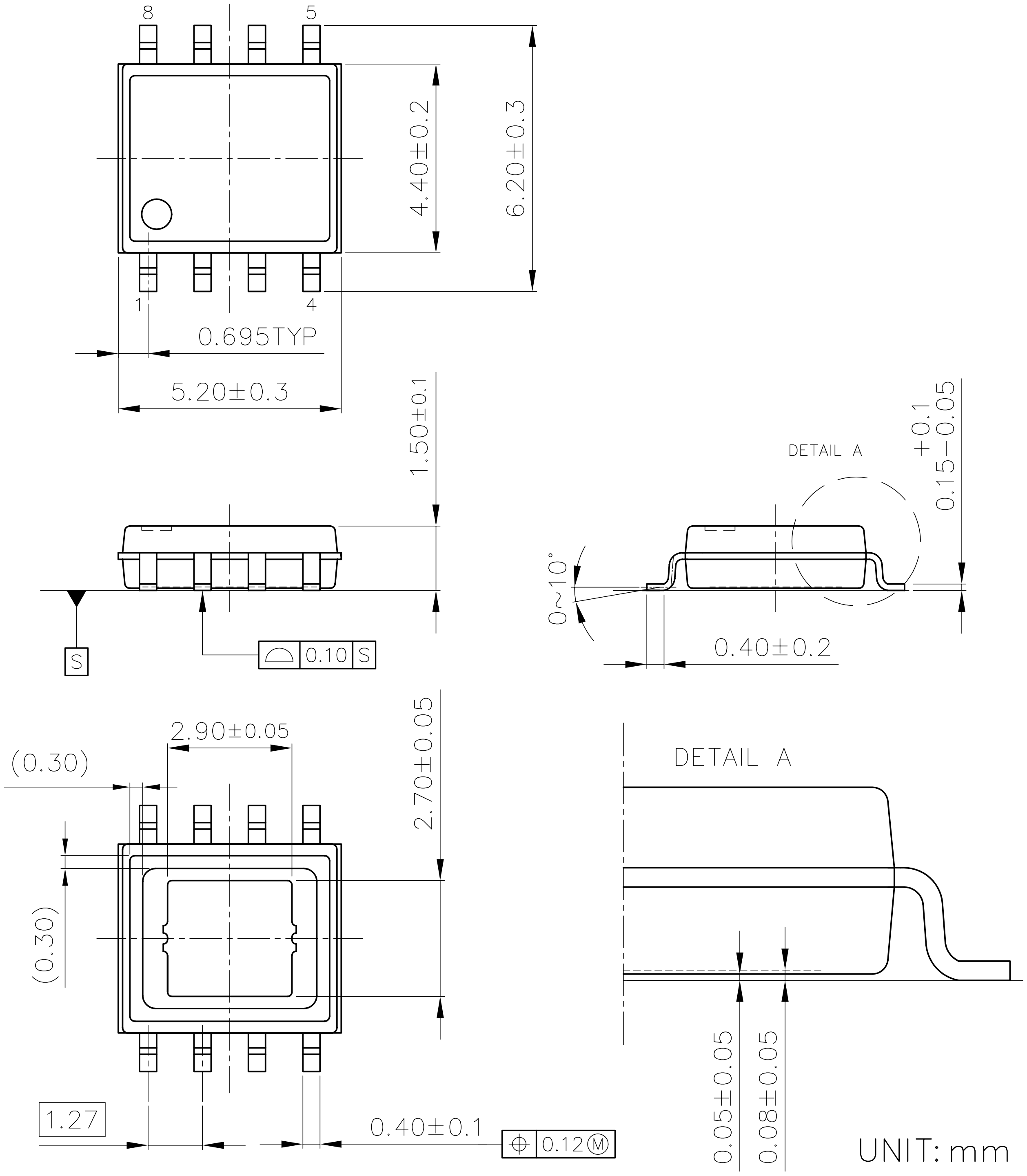


Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

DM-HSOP-8E-JE-B



HSOP-8E Package Dimensions

1. The products and the product specifications described in this document are subject to change or discontinuation of production without notice for reasons such as improvement. Therefore, before deciding to use the products, please refer to our sales representatives for the latest information thereon.
2. The materials in this document may not be copied or otherwise reproduced in whole or in part without the prior written consent of us.
3. This product and any technical information relating thereto are subject to complementary export controls (so-called KNOW controls) under the Foreign Exchange and Foreign Trade Law, and related politics ministerial ordinance of the law. (Note that the complementary export controls are inapplicable to any application-specific products, except rockets and pilotless aircraft, that are insusceptible to design or program changes.) Accordingly, when exporting or carrying abroad this product, follow the Foreign Exchange and Foreign Trade Control Law and its related regulations with respect to the complementary export controls.
4. The technical information described in this document shows typical characteristics and example application circuits for the products. The release of such information is not to be construed as a warranty of or a grant of license under our or any third party's intellectual property rights or any other rights.
5. The products listed in this document are intended and designed for automotive applications. Those customers intending to use a product in an application requiring extreme quality and reliability, for example, in a highly specific application where the failure or misoperation of the product could result in human injury or death should first contact us.
    - Aerospace Equipment
    - Equipment Used in the Deep Sea
    - Power Generator Control Equipment (nuclear, steam, hydraulic, etc.)
    - Life Maintenance Medical Equipment
    - Fire Alarms / Intruder Detectors
    - Vehicle Control Equipment (airplane, railroad, ship, etc.)
    - Various Safety Devices
    - Traffic control system
    - Combustion equipment

    In case your company desires to use this product for any applications other than general electronic equipment mentioned above, make sure to contact our company in advance. Note that the important requirements mentioned in this section are not applicable to cases where operation requirements such as application conditions are confirmed by our company in writing after consultation with your company.
6. We are making our continuous effort to improve the quality and reliability of our products, but semiconductor products are likely to fail with certain probability. In order to prevent any injury to persons or damages to property resulting from such failure, customers should be careful enough to incorporate safety measures in their design, such as redundancy feature, fire containment feature and fail-safe feature. We do not assume any liability or responsibility for any loss or damage arising from misuse or inappropriate use of the products.
7. The products have been designed and tested to function within controlled environmental conditions. Do not use products under conditions that deviate from methods or applications specified in this datasheet. Failure to employ the products in the proper applications can lead to deterioration, destruction or failure of the products. We shall not be responsible for any bodily injury, fires or accident, property damage or any consequential damages resulting from misuse or misapplication of the products.
8. Quality Warranty

    8-1. Quality Warranty Period

    In the case of a product purchased through an authorized distributor or directly from us, the warranty period for this product shall be one (1) year after delivery to your company. For defective products that occurred during this period, we will take the quality warranty measures described in section 8-2. However, if there is an agreement on the warranty period in the basic transaction agreement, quality assurance agreement, delivery specifications, etc., it shall be followed.

    8-2. Quality Warranty Remedies

    When it has been proved defective due to manufacturing factors as a result of defect analysis by us, we will either deliver a substitute for the defective product or refund the purchase price of the defective product.

    Note that such delivery or refund is sole and exclusive remedies to your company for the defective product.

    8-3. Remedies after Quality Warranty Period

    With respect to any defect of this product found after the quality warranty period, the defect will be analyzed by us. On the basis of the defect analysis results, the scope and amounts of damage shall be determined by mutual agreement of both parties. Then we will deal with upper limit in Section 8-2. This provision is not intended to limit any legal rights of your company.
9. Anti-radiation design is not implemented in the products described in this document.
10. The X-ray exposure can influence functions and characteristics of the products. Confirm the product functions and characteristics in the evaluation stage.
11. WLCSP products should be used in light shielded environments. The light exposure can influence functions and characteristics of the products under operation or storage.
12. Warning for handling Gallium and Arsenic (GaAs) products (Applying to GaAs MMIC, Photo Reflector). These products use Gallium (Ga) and Arsenic (As) which are specified as poisonous chemicals by law. For the prevention of a hazard, do not burn, destroy, or process chemically to make them as gas or power. When the product is disposed of, please follow the related regulation and do not mix this with general industrial waste or household waste.
13. Please contact our sales representatives should you have any questions or comments concerning the products or the technical information.

NISSHINBO

Nisshinbo Micro Devices Inc.

Official website

https://www.nisshinbo-microdevices.co.jp/en/

Purchase information

https://www.nisshinbo-microdevices.co.jp/en/buy/