CA0020AN

Confidential

Voltage Detector IC (in vehicle)

■Device description

CA0020AN monitors power supply voltage of multiple systems in a car by single chip.
Low consumption current is achieved by high-voltage CMOS process,this IC is suitable for power monitoring of a battery etc.With its small package, the IC is suitable for downsizing or high density packaging of equipment.

■Functions and features

- 6 system voltage monitoring by single IC
- Comparator with hysteresis: 5 system, comparator without hysteresis: 1 system
- N-channel open drain output (DOUT)
- Small, a thin shape base mounting type package (Plating Lead Package：3.65mm×2.7mm×t:0.58mm 14PIN）

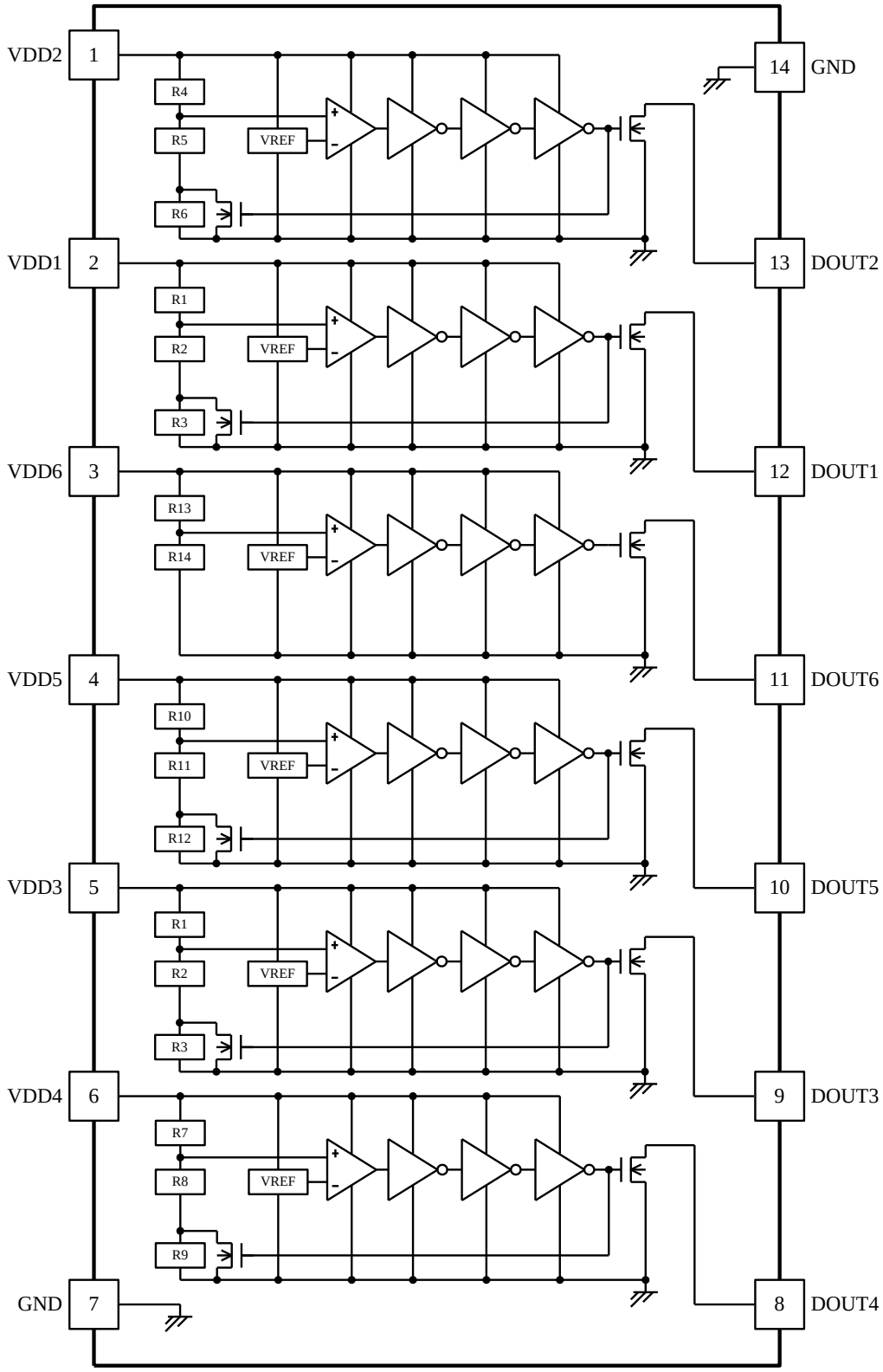
■MAXIMUM RATINGS

Item	Symbol	Ratings	Unit
Power supply voltage	VDD	GND-0.3～30	V
DOUT pin input voltage	DOUT	GND-0.3～8	V
IOUT pin input current	IOUT	20	mA
Power dissipation	Pd	150	mW
Operating ambient temperature	Ta	-40～+85	ºC
Junction temperature	Tj	+125	ºC
Storage temperature	Tstg	-40～+125	ºC

■RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Ratings	Unit
Power supply voltage	VDD	0～24	V
DOUT pin input voltage	DOUT	5	V
VDD input resistance	—	10±0.5%	kΩ

■BLOCK DIAGRAM



■ELECTRICAL CHARACTERISTICS

VDD Input protected resistance value 10kΩ (*1). Unless otherwise specified, Ta = -40ºC to +85ºC (*2).

Item	Symbol	Terminal	Condition	MIN	TYP	MAX	Unit
Input voltage	VDD	VDD1,VDD2,VDD3 VDD4,VDD5,VDD6				24	V
Consumption current	IDD	VDD1,VDD2,VDD3, VDD4,VDD5	VDD=($-V_{DET}$)-0.1V	7.5	15.0	22.5	μA
			VDD=($+V_{DET}$)+1.0V	10.0	20.0	30.0	
			VDD=16V	15.0	30.0	45.0	
		VDD6	VDD=($-V_{DET}$)-0.1V	6.5	13.0	19.5	
			VDD=($+V_{DET}$)+1.0V	8.5	17.0	25.5	
			VDD=16V	15.0	30.0	45.0	
Release voltage ($+V_{DET}$) and detection voltage ($-V_{DET}$)	$-V_{DET}$	VDD1		7.000	7.500	8.000	V
	$+V_{DET}$			8.500	9.000	9.500	
	$-V_{DET}$	VDD2		7.500	8.000	8.500	
	$+V_{DET}$			8.000	8.500	9.000	
	$-V_{DET}$	VDD3		7.000	7.500	8.000	
	$+V_{DET}$			8.500	9.000	9.500	
	$-V_{DET}$	VDD4		6.000	6.500	7.000	
	$+V_{DET}$			6.500	7.000	7.500	
	$-V_{DET}$	VDD5		6.500	7.000	7.500	
	$+V_{DET}$			7.000	7.500	8.000	
	$-V_{DET}$	VDD6		4.700	5.200	5.700	
	$+V_{DET}$			4.700	5.200	5.700	
Output current	IOUT	VDD1,VDD2,VDD3 VDD4,VDD5,VDD6	VDD=13V, V_{DS}=0.1V	0.5			mA

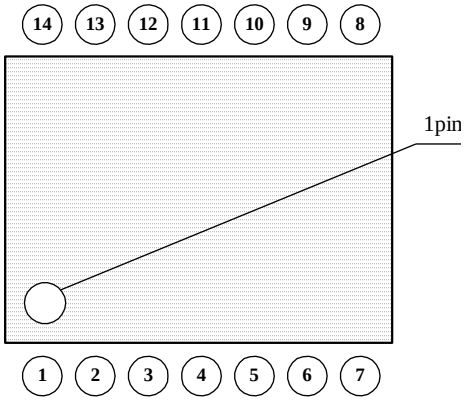
*1 Dispersion (±0.5%) of the input protected resistance inserted in VDD is included in this specification.

*2 Specification at high and low temperature are guaranteed by design, production testing performed at room temperature.

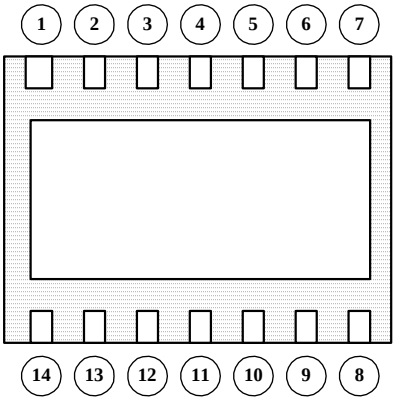
■TERMINAL FUNCTIONS

Pin No.	Symbol	Function
1	VDD2	Power supply terminal 2
2	VDD1	Power supply terminal 1
3	VDD6	Power supply terminal 6
4	VDD5	Power supply terminal 5
5	VDD3	Power supply terminal 3
6	VDD4	Power supply terminal 4
7	GND	Ground terminal
8	DOUT4	Reset output terminal 4 (N-channel open drain)
9	DOUT3	Reset output terminal 3 (N-channel open drain)
10	DOUT5	Reset output terminal 5 (N-channel open drain)
11	DOUT6	Reset output terminal 6 (N-channel open drain)
12	DOUT1	Reset output terminal 1 (N-channel open drain)
13	DOUT2	Reset output terminal 2 (N-channel open drain)
14	GND	Ground terminal

Top view



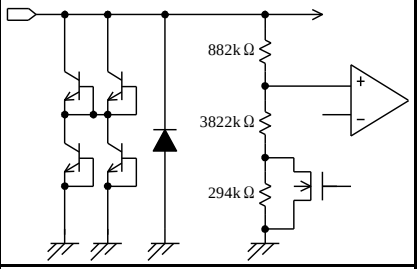
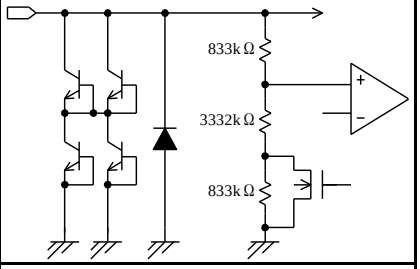
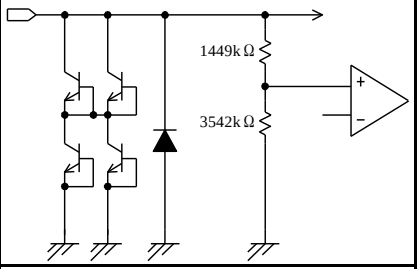
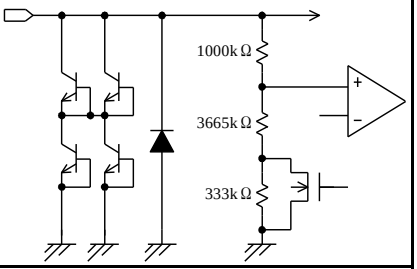
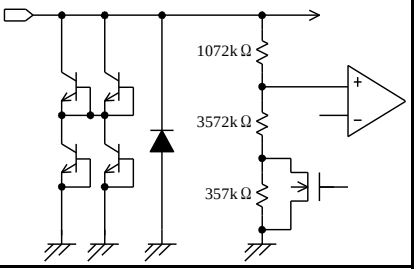
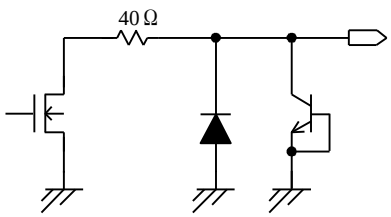
Bottom view



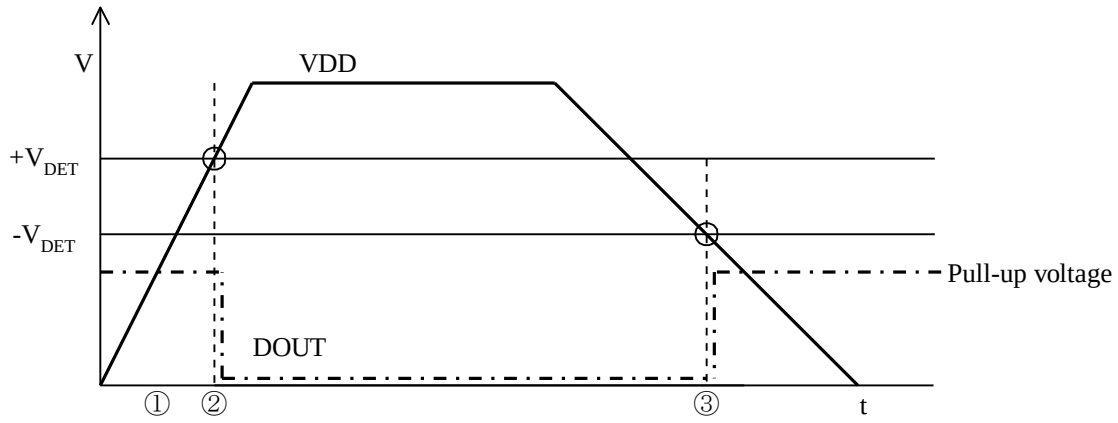
Please ground both 7pin and 14pin of GND.
Power supply terminal of the non-use connect to the GND through low resistance or directly.
Please open output terminal.

Open the electric potential of the die pad on the back side of the package or connect the die pad to the GND.
When the die pad is connected to the GND, do not use the die pad as the electrode unless shorting with 7 pin or 14pin.

■EQUIVALENT CIRCUIT of INPUT and OUTPUT TERMINAL

Pin No.	Symbol	I/O	Equivalent circuit
1	VDD2	IN	
2, 5	VDD1 VDD3	IN	
3	VDD6	IN	
4	VDD5	IN	
6	VDD4	IN	
7,14	GND	IN	
8～13	DOUT1～DOUT6	OUT	

■OPERATION EXPLANATION

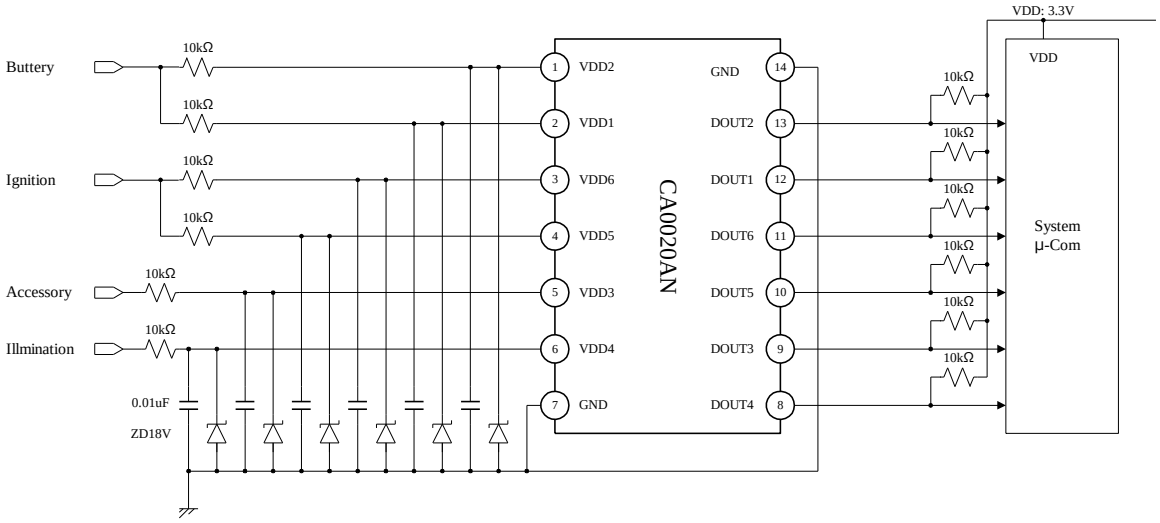


①. DOUT becomes the high voltage (pull-up voltage) when the power supply voltage VDD is lower than the release voltage $+V_{DET}$.

②. DOUT switches to low voltage from high voltage when the power supply voltage VDD rises above the release voltage +VDET.

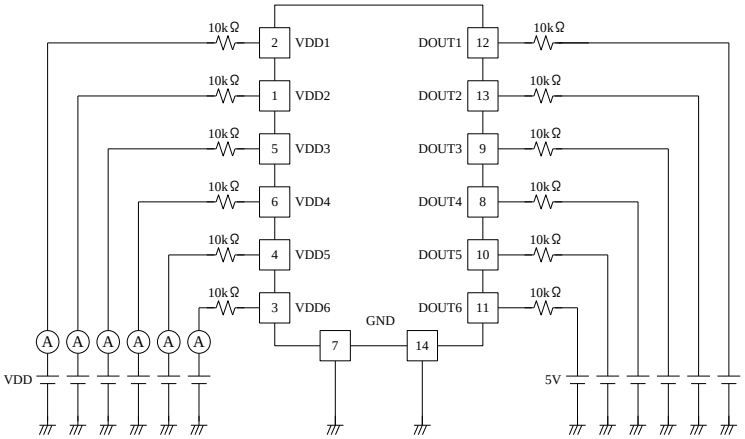
③. DOUT switches to high voltage from low voltage when the power supply voltage VDD falls below the detection voltage -VDET.

■EXTERNAL COMPONENTS and CONNECTIONS EXAMPLE

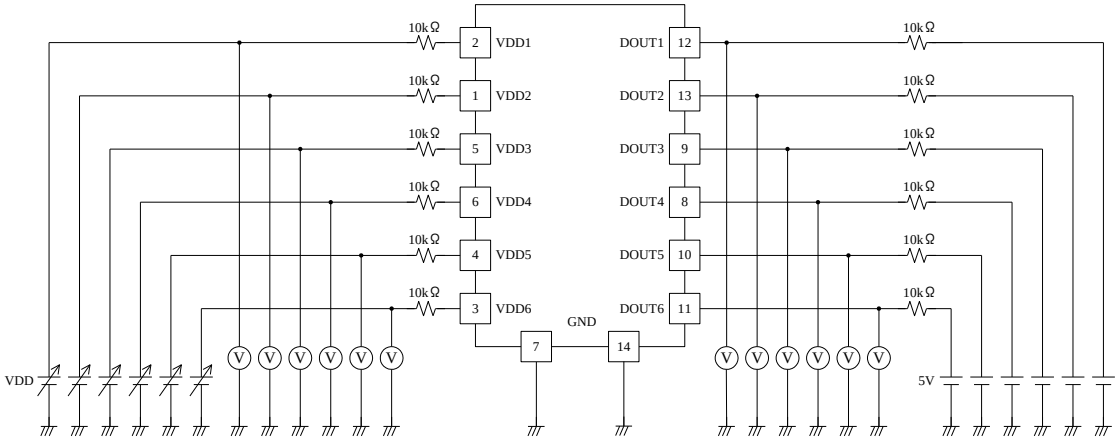


※ Connection and constant of DOUT pin external resistor in the above figure does not guarantee the operation. Please select the constant perform enough evaluation including the temperature characteristics. It is recommend to connect Zener diode and capacitor to VDD input terminal for damage and malfunction prevention by excessive input of power supply voltage.

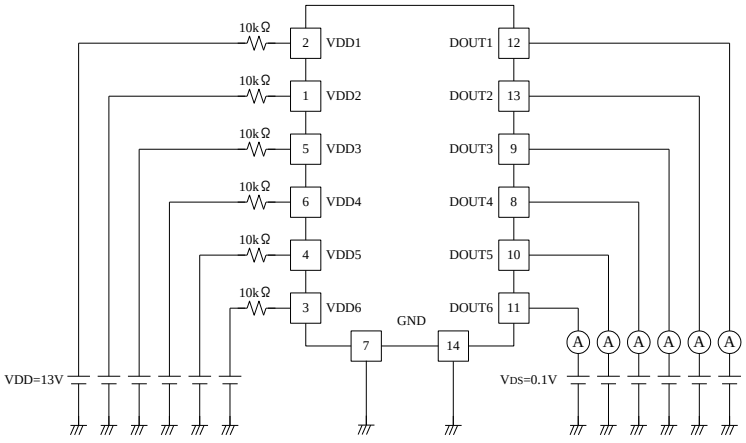
■MEASUREMENT CIRCUIT DIAGRAM



Consumption current test circuit

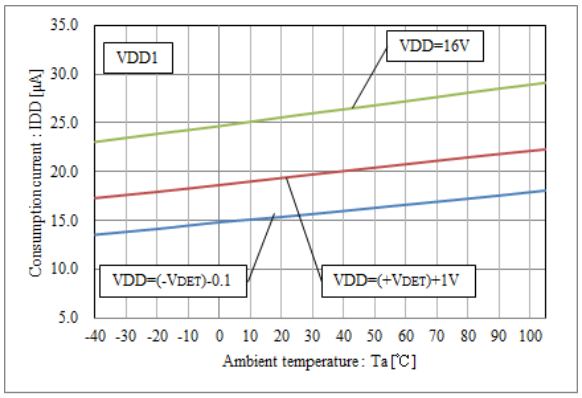


Release voltage,detection voltage test circuit

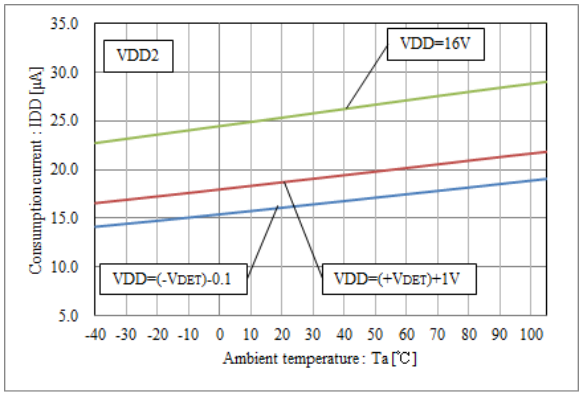


Output current test circuit

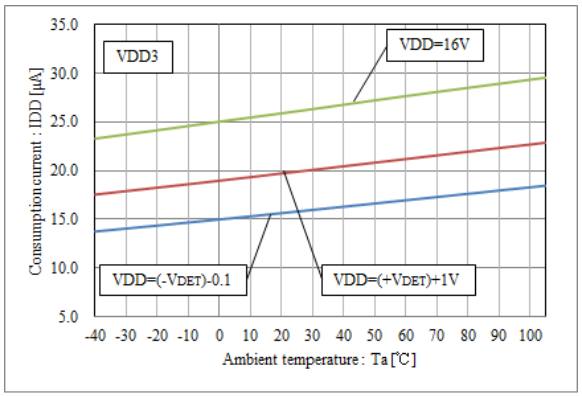
■ELECTRICAL CHARACTERISTIC DATA(REFERENCE)



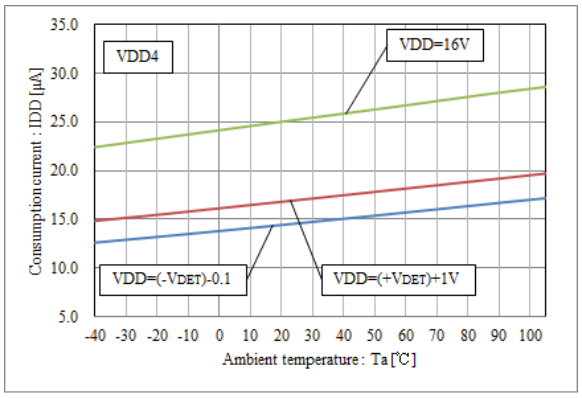
VDD1 Consumption current vs.Temperature



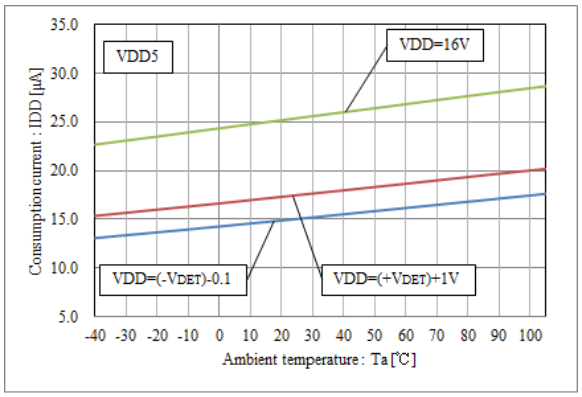
VDD2 Consumption current vs.Temperature



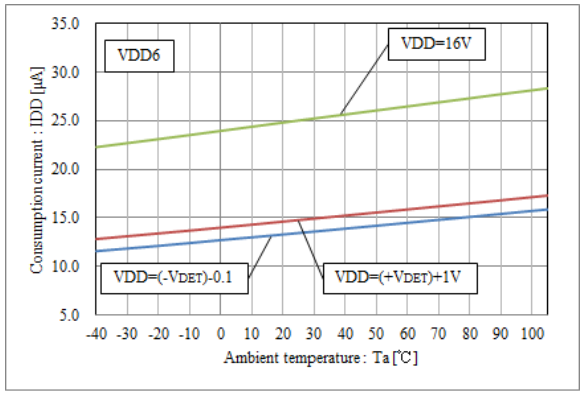
VDD3 Consumption current vs.Temperature



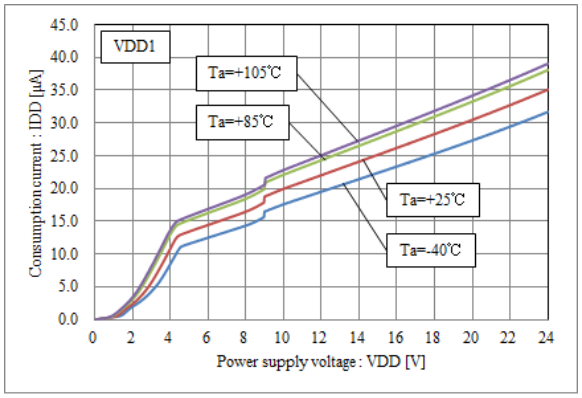
VDD4 Consumption current vs.Temperature



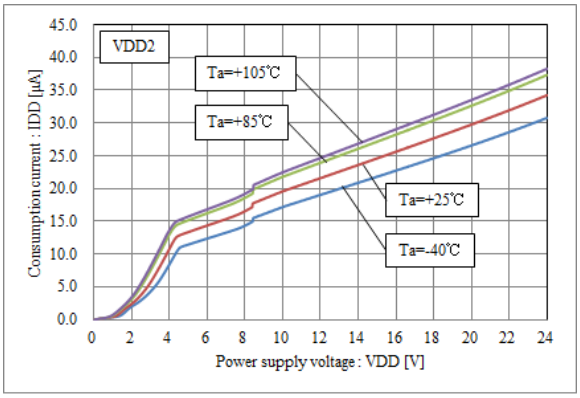
VDD5 Consumption current vs.Temperature



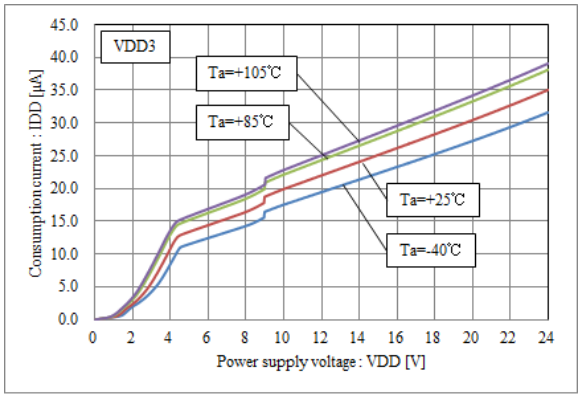
VDD6 Consumption current vs.Temperature



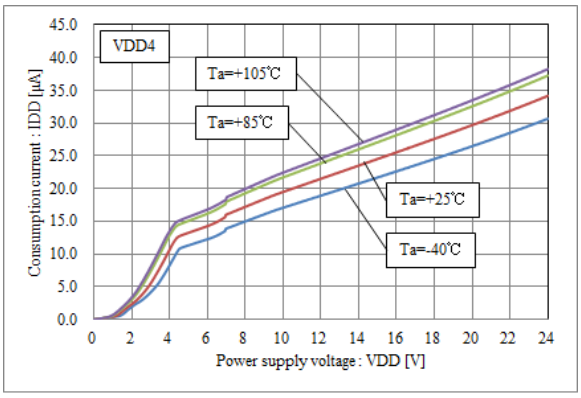
VDD1 Consumption current vs.Power supply voltage



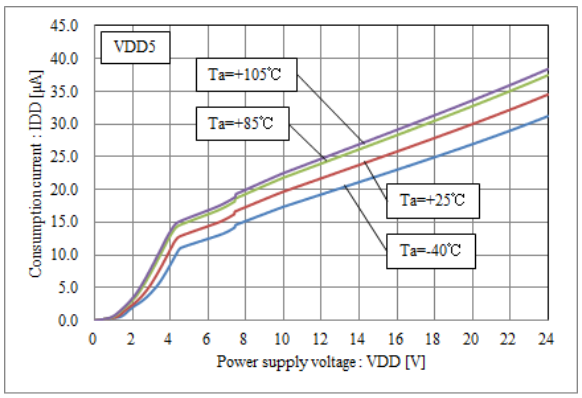
VDD2 Consumption current vs.Power supply voltage



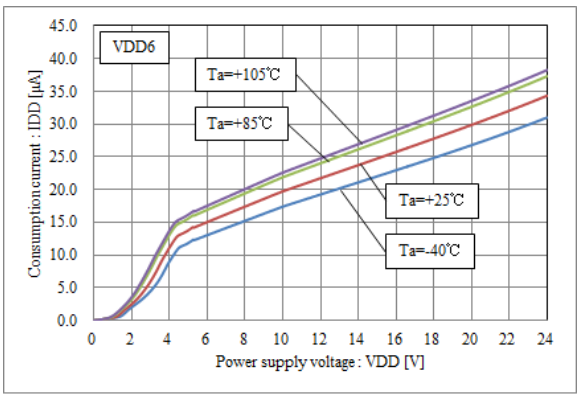
VDD3 Consumption current vs.Power supply voltage



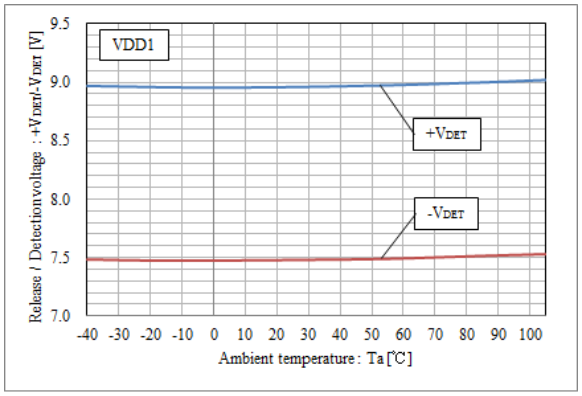
VDD4 Consumption current vs.Power supply voltage



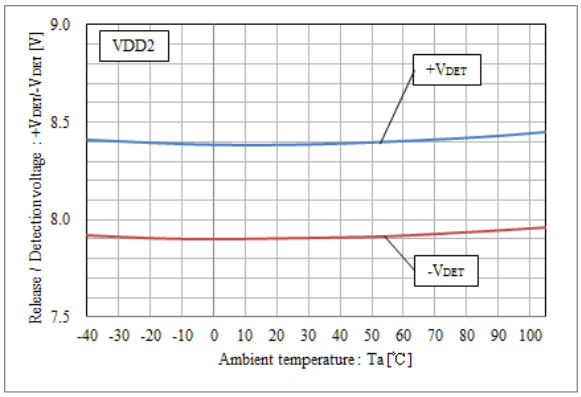
VDD5 Consumption current vs.Power supply voltage



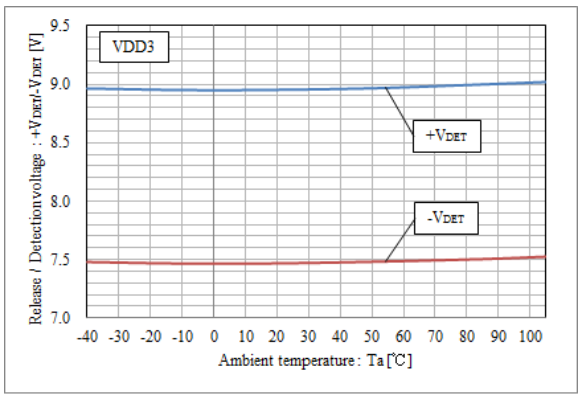
VDD6 Consumption current vs.Power supply voltage



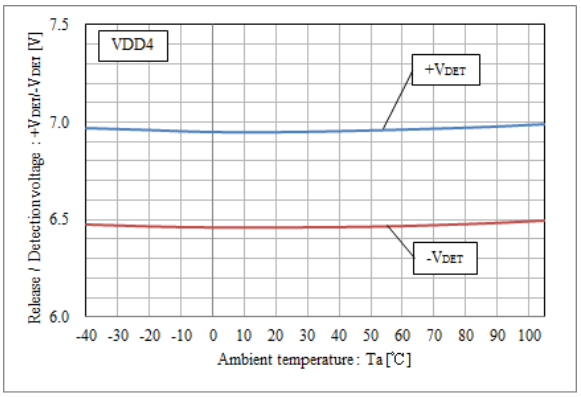
VDD1 Release/Detection voltage vs.Temperature



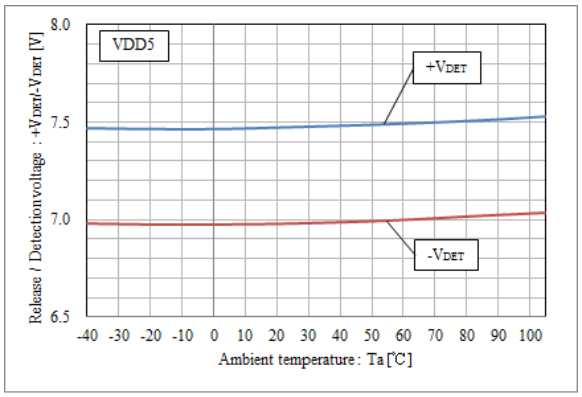
VDD2 Release/Detection voltage vs.Temperature



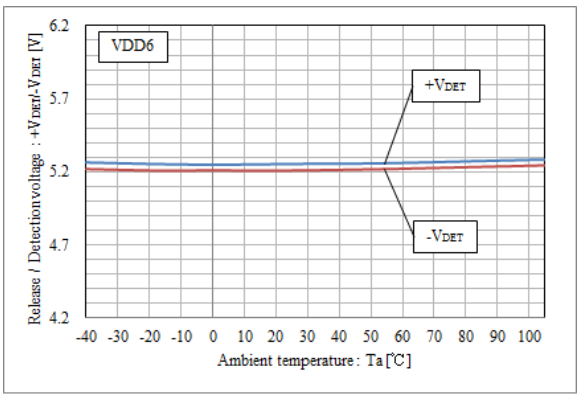
VDD3 Release/Detection voltage vs.Temperature



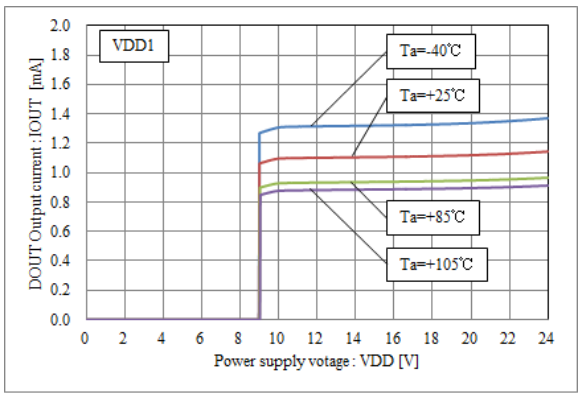
VDD4 Release/Detection voltage vs.Temperature



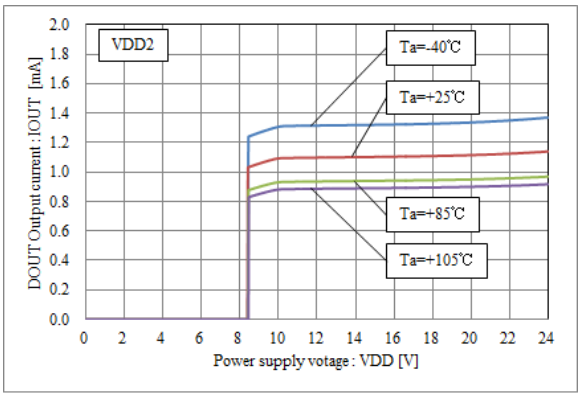
VDD5 Release/Detection voltage vs.Temperature



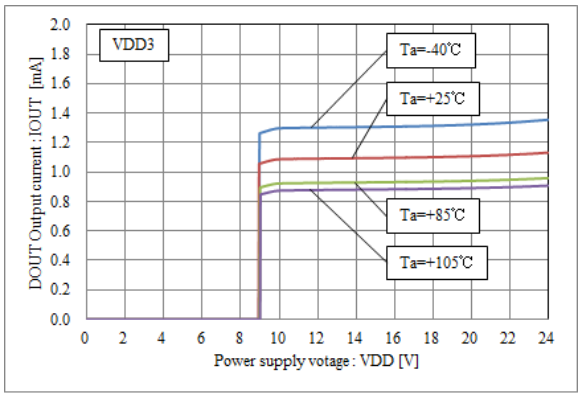
VDD6 Release/Detection voltage vs.Temperature



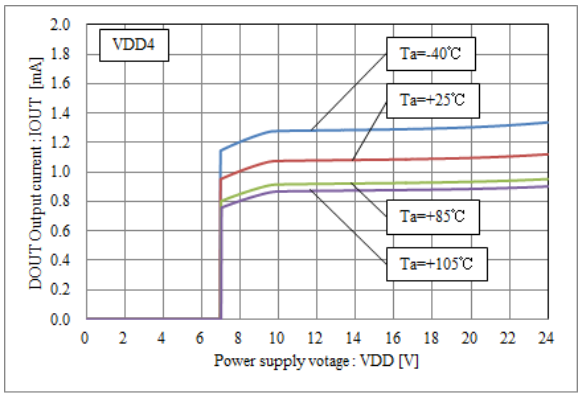
DOUT1 Output current vs.Power supply voltage



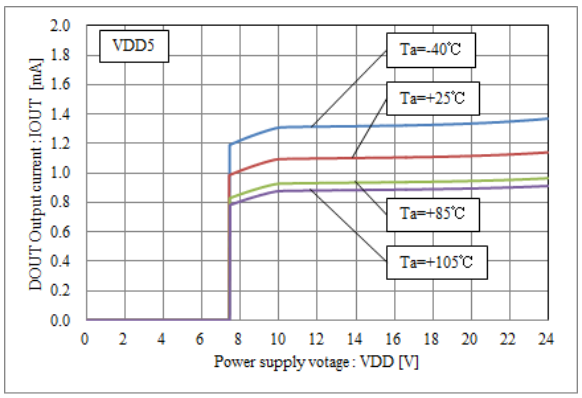
DOUT2 Output current vs.Power supply voltage



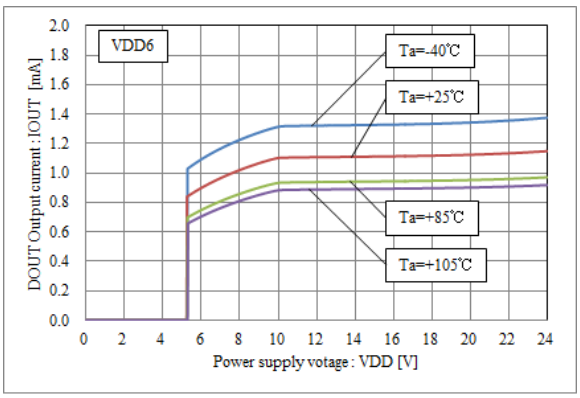
DOUT3 Output current vs.Power supply voltage



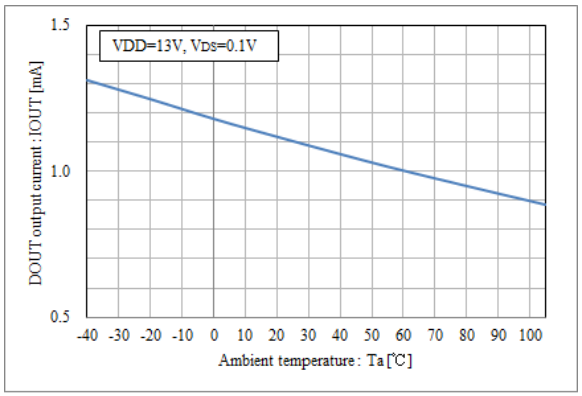
DOUT4 Output current vs.Power supply voltage



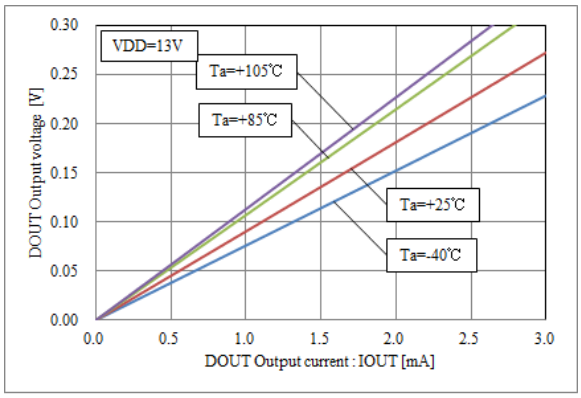
DOUT5 Output current vs.Power supply voltage



DOUT6 Output current vs.Power supply voltage

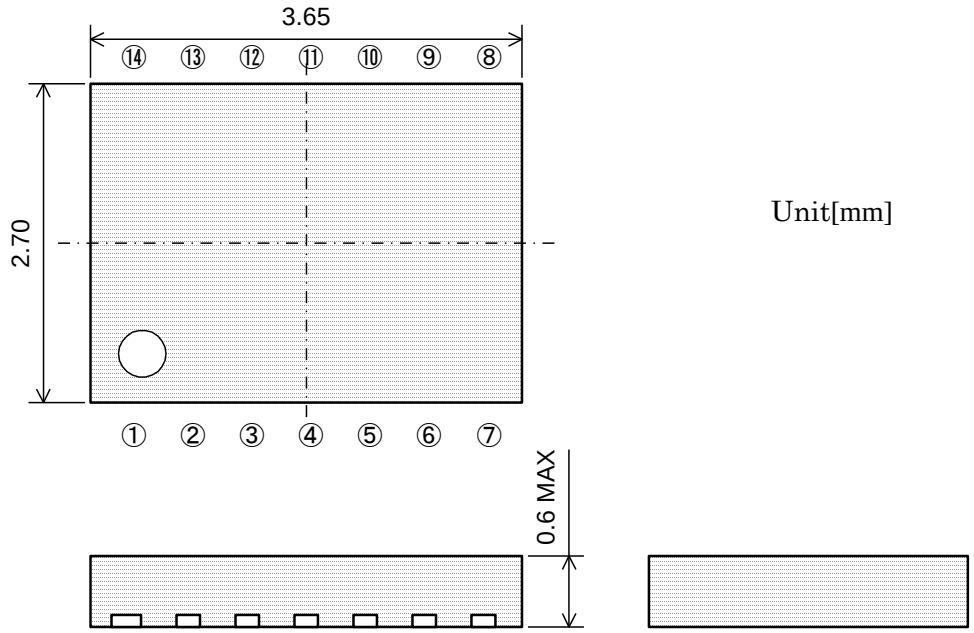


DOUT output current vs.Temperature

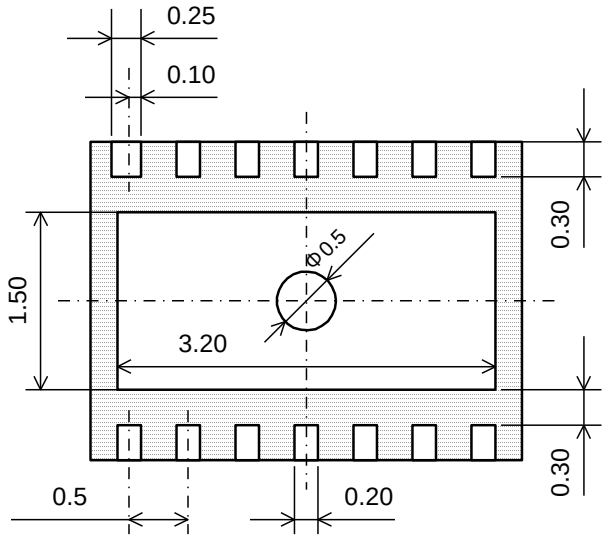


DOUT Output voltage vs.Output current

■ EXTERNAL DIMENSIONS



Unit[mm]



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