

STRUCTURE	Silicon Monolithic Integrated Circuit
PRODUCTSERIES	Strobe Charge Control IC
TYPE	BD4210EKN
FEATURES	<ol style="list-style-type: none"> 1. Adjustable transformer primary-side peak current 2. Built-in IGBT driver 3. Includes charge complete signal output (FULL) pin. 4. Includes charge voltage detection (VC) pin (can be set externally).

○ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	BD4210EKN	Unit
Supply voltage	VCC	10	V
PVC pin (DC characteristics)	PVDC	36	V
PVC pin (PULSE characteristics) *1	PVCPULSE	50	V
Output current	IPVC	2.2	A
FULL pin voltage	VFULL	10	V
START pin voltage	VSTART	10	V
IGBT driver voltage	VDD2	7	V
IGBT driver input voltage range	VIGBT_IN	-0.3~VDD2+0.3	V
Operating temperature range	Topr	-35~+85	°C
Storage temperature range	Tstg	-55~+125	°C
Power dissipation	Pd	2.25	W
Junction temperature *2	Tjmax	125	°C

*1: Pulse width of 100 μs or less.

*2: Reduced by 22.5 mW/°C over Ta = 25°C. (When mounted on 70 mm × 70 mm × 1.6 mm, glass epoxy)

○ Recommended Operating Ranges (Ta=-35~85°C)

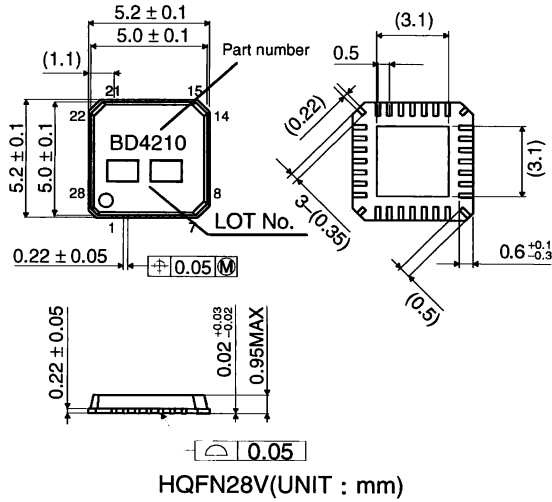
Parameter	Symbol	BD4210EKN	Unit
VCC supply voltage range	VCC	2.5~9	V
PVC voltage range	VPVC	~35	V
VDD2 supply voltage range	VDD2	2.5~6	V
I_ADJ pin input voltage range	VI_ADJ	0.05~1	V
Primary-side peak current setting range	IPVC	0.5~2.0	A
RT pin resistance range	RT	10~200	kΩ

○ Electrical Characteristics (Ta=25°C, VCC=3.0V,VDD2=2.5V)

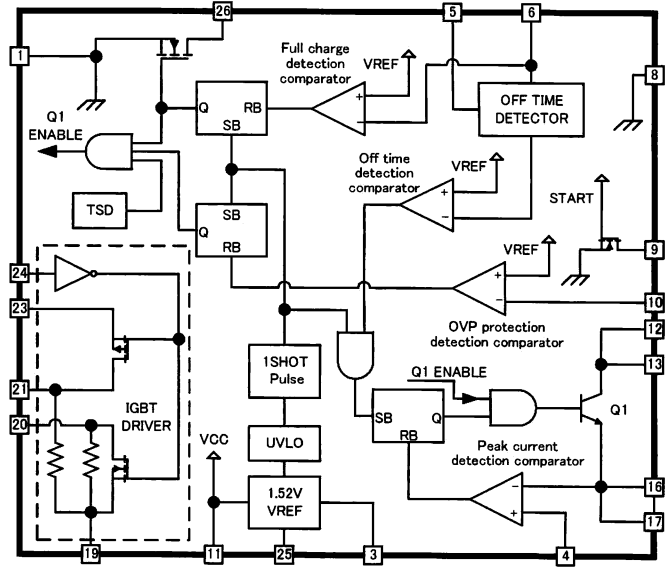
Parameter	Symbol	Limits			Unit	Conditions
		Min.	Typ.	Max.		
[Overall device]						
Average operating current consumption	ICCA	—	25	30	mA	START=3V,Ipeak=1A
Circuit current during standby operation	ICCS	—	0	1	μA	START=0V
[Reference voltage]						
Output voltage	VREF	1.480	1.520	1.560	V	IREF=-1mA
Output current	IVREF	1	—	—	mA	
Current capacity when shorted	ISHORT	3.5	5.5	—	mA	
[Standby control START pin]						
START pin high voltage	VSTH	2.0	—	—	V	
START pin low voltage	VSTL	—	—	0.3	V	
Input bias current	IST	50	70	100	μA	START=3V
[Protection circuit block]						
UVLO detection voltage	VUVLOT	—	2.1	2.25	V	
OVP comparator detection voltage	VOVPTH	1.490	1.520	1.550	V	
OVP pin sink current	IOVPI	—	0.1	1	μA	VOVP=3V
OVP_SW pin on resistance	ROVP_SW	—	200	500	Ω	
[Transformer primary-side driver block]						
Leak current when driver off	Ileak	—	—	1.0	μA	VPVC=36V
PVC saturation voltage*	VPVCE	—	0.25	0.3	V	IPVC=1A
I_ADJ source current	I_ADJI	—	0.1	1	μA	VI_ADJ=0V
Primary-side peak current detection comparator offset voltage	Δ Vcomp1	-10	—	10	mV	
[Off time determination block]						
RT pin open voltage 1	VRTO1	0.20	0.3	0.4	V	VC=0V,RT=200kΩ
RT pin open voltage 2	VRTO2	1.470	1.5	1.530	V	VC=1.5V,RT=200kΩ
Off time 1	TOFF1	7.65	9.0	10.35	μs	VC=0.5V,RT=200kΩ
Off time 1'	TOFF1'	3.8	4.5	5.2	μs	VC=0.5V,RT=100kΩ
Off time 2	TOFF2	2.8	3.3	3.8	μs	VC=1.4V,RT=200kΩ
Off time 2'	TOFF2'	1.35	1.6	1.85	μs	VC=1.4V,RT=100kΩ
[Transformer secondary-side detection block]						
Full charge detection voltage	VCTH	1.505	1.520	1.535	V	
FULL pin low voltage when charging	VFULLL	—	0.3	1	V	VDD2=3.0V, RFULL=10kΩ
FULL pin leak current	IFULLH	—	—	1	μA	VDD2=3.0V
[IGBT driver block]						
High level current consumption	IDD2H	—	0.6	1	mA	IGBT_OUTP, IGBT_OUTN are shorted
Low level current consumption	IDD2L	—	—	1	μA	
High level input voltage	VINH	VDD2*0.8	—	VDD2	V	
Low level input voltage	VINL	—	—	1.0	V	
High level input sink current	IINH	—	10	20	μA	IGBT_IN=2.5V
Low level input sink current	IINL	—	—	1	μA	
Turn-on rise time	tr	—	300	500	ns	C=4700pF
Turn-off fall time	tf	—	300	500	ns	C=4700pF
Turn-on delay time	tdon	—	170	500	ns	C=4700pF
Turn-off delay time	tdoff	—	100	500	ns	C=4700pF
On resistance at high output	RONH	—	10	30	Ω	
On resistance at low output	RONL	—	4.5	30	Ω	

*Design guarantee. (Not all units are inspected.)

○ PACKAGE



○ Block Diagram



○ PIN No. PIN Name

PIN No.	PIN Name	Function
1	GND	System ground pin
2	N/C	-
3	VREF	1.52 V reference voltage output pin
4	I_ADJ	Primary-side peak current setting pin
5	RT	Off time setting pin
6	VC	Full charge detection pin
7	N/C	-
8	PGND1	Power ground pin
9	OVP_SW	OVP detection switching pin
10	OVP	OVP detection pin
11	VCC	Power supply pin
12	PVC	Power transistor collector pin
13	PVC	Power transistor collector pin
14	N/C	-

PIN No.	PIN Name	Function
15	N/C	-
16	PVE	Power transistor emitter pin
17	PVE	Power transistor emitter pin
18	N/C	-
19	PGND2	IGBT driver ground pin
20	IGBT_OUTN	IGBT driver low-side output pin
21	IGBT_OUTP	IGBT driver high-side output pin
22	N/C	-
23	VDD2	IGBT driver power supply pin
24	IGBT_IN	IGBT driver input pin
25	START	Charge start pin
26	FULL	Charge complete signal output pin
27	N/C	-
28	N/C	-

*N/C is non connected pin in electrical open.

○Precautions

1. Absolute maximum ratings
 Use of the IC in excess of absolute maximum ratings such as the applied voltage or operating temperature range may result in IC deterioration or damage. Assumptions should not be made regarding the state of the IC (short mode or open mode) when such damage is suffered. A physical safety measure such as a fuse should be implemented when use of the IC in a special mode where the absolute maximum ratings may be exceeded is anticipated.

2. GND potential
 Ensure a minimum GND pin potential in all operating conditions. In addition, ensure that no pins other than the GND pin carry a voltage less than or equal to the GND pin, including during actual transient phenomena.
 The PVC pin may be exposed to negative voltages due to the characteristics of the external transformer. It is recommended to connect a schottky diode between the PVC and GND pins when variations in electrical characteristics or damage is possible due to the PVC pin carrying a negative voltage.

3. Thermal design
 Use a thermal design that allows for a sufficient margin in light of the power dissipation (Pd) in actual operating conditions.

4. Inter-pin shorts and mounting errors
 Use caution when orienting and positioning the IC for mounting on printed circuit boards. Improper mounting may result in damage to the IC. Shorts between output pins or between output pins and the power supply GND pin caused by the presence of a foreign object may result in damage to the IC.

5. Common impedance
 Power supply and ground wiring should reflect consideration of the need to lower common impedance and minimize ripple as much as possible (by making wiring as short and thick as possible or rejecting ripple by incorporating inductance and capacitance).

6. IC pin input
 This monolithic IC contains P+ isolation and P substrate layers between adjacent elements in order to keep them isolated. P/N junctions are formed at the intersection of these P layers with the N layers of other elements to create a variety of parasitic elements.

For example, when a resistor and transistor are connected to pins as shown in Fig. 16, the P/N junction functions as a parasitic diode when $GND > (Pin A)$ for the resistor or $GND > (Pin B)$ for the transistor (NPN). Similarly, when $GND > (Pin B)$ for the transistor (NPN), the parasitic diode described above combines with the N layer of other elements to operate as a parasitic NPN transistor.

The formation of parasitic elements as a result of the relationships of the potentials of different pins is an inevitable result of the IC's architecture. The operation of parasitic elements can cause interference with circuit operation as well as IC malfunction and damage. For these reasons, it is necessary to use caution so that the IC is not used in a way that will trigger the operation of parasitic elements, such as by the application of voltages lower than the GND (P substrate) voltage to input and output pins.

The PVC pin may be exposed to negative voltages due to the characteristics of the external transformer. It is recommended to connect a schottky diode between the PVC and GND pins when variations in electrical characteristics or damage is possible due to the PVC pin carrying a negative voltage.

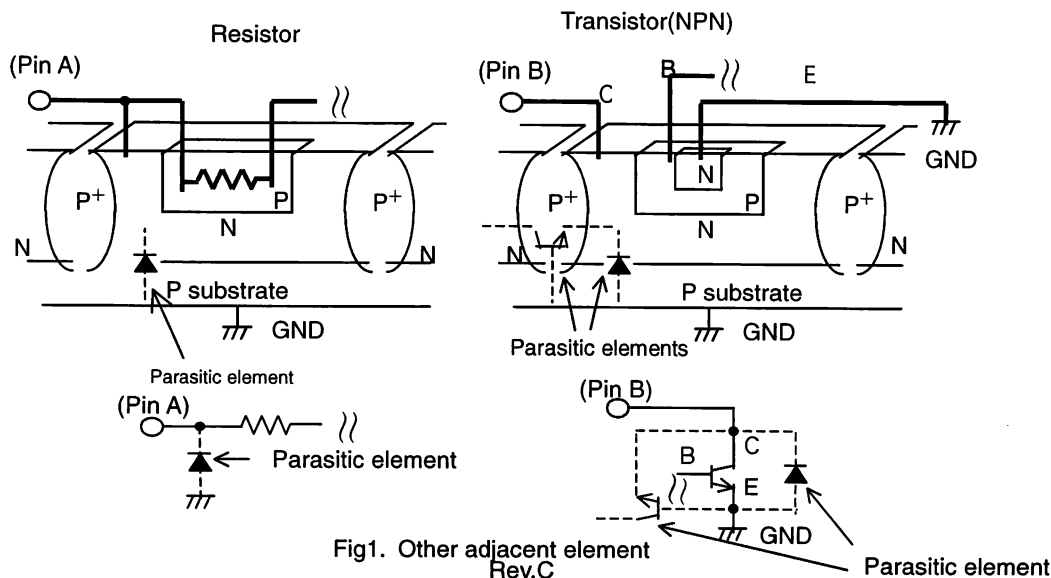


Fig1. Other adjacent element Rev.C

Notes

- No technical content pages of this document may be reproduced in any form or transmitted by any means without prior permission of ROHM CO.,LTD.
- The contents described herein are subject to change without notice. The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than for buyer's right to use such devices itself, resell or otherwise dispose of the same, no express or implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by
- ROHM CO., LTD. is granted to any such buyer.
- Products listed in this document are no antiradiation design.

The products listed in this document are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys).

Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

About Export Control Order in Japan

Products described herein are the objects of controlled goods in Annex 1 (Item 16) of Export Trade Control Order in Japan.

In case of export from Japan, please confirm if it applies to "objective" criteria or an "informed" (by MITI clause) on the basis of "catch all controls for Non-Proliferation of Weapons of Mass Destruction.

Thank you for your accessing to ROHM product informations.
More detail product informations and catalogs are available,
please contact your nearest sales office.

Please contact our sales offices for details ;

U.S.A / San Diego	TEL : +1(858)625-3630	FAX : +1(858)625-3670
Atlanta	TEL : +1(770)754-5972	FAX : +1(770)754-0691
Dallas	TEL : +1(972)312-8818	FAX : +1(972)312-0330
Germany / Dusseldorf	TEL : +49(2154)9210	FAX : +49(2154)921400
United Kingdom / London	TEL : +44(1)908-282-666	FAX : +44(1)908-282-528
France / Paris	TEL : +33(0)1 56 97 30 60	FAX : +33(0) 1 56 97 30 80
China / Hong Kong	TEL : +852(2)740-6262	FAX : +852(2)375-8971
Shanghai	TEL : +86(21)6279-2727	FAX : +86(21)6247-2066
Dilian	TEL : +86(411)8230-8549	FAX : +86(411)8230-8537
Beijing	TEL : +86(10)8525-2483	FAX : +86(10)8525-2489
Taiwan / Taipei	TEL : +866(2)2500-6956	FAX : +866(2)2503-2869
Korea / Seoul	TEL : +82(2)8182-700	FAX : +82(2)8182-715
Singapore	TEL : +65-6332-2322	FAX : +65-6332-5662
Malaysia / Kuala Lumpur	TEL : +60(3)7958-8355	FAX : +60(3)7958-8377
Philippines / Manila	TEL : +63(2)807-6872	FAX : +63(2)809-1422
Thailand / Bangkok	TEL : +66(2)254-4890	FAX : +66(2)256-6334

Japan /
(Internal Sales)

Tokyo	2-1-1, Yaesu, Chuo-ku, Tokyo 104-0082	TEL : +81(3)5203-0321	FAX : +81(3)5203-0300
Yokohama	2-4-8, Shin Yokohama, Kohoku-ku, Yokohama, Kanagawa 222-8575	TEL : +81(45)476-2131	FAX : +81(45)476-2128
Nagoya	Dainagayo Building 9F 3-28-12, Meieki, Nakamura-ku, Nagoya, Aichi 450-0002	TEL : +81(52)581-8521	FAX : +81(52)561-2173
Kyoto	579-32 Higashi Shiokouji-cho, Karasuma Nishi-iru, Shiokoujidori, Shimogyo-ku, Kyoto 600-8216	TEL : +81(75)311-2121	FAX : +81(75)314-6559

(Contact address for overseas customers in Japan)

Yokohama	TEL : +81(45)476-9270	FAX : +81(045)476-9271
----------	-----------------------	------------------------