

High Side Switch IC and Load Switch IC

List of Products with Countermeasures against Reverse Voltage Application

Table 1 summarizes the concerns and recommended products when a reverse voltage is applied ($V_{OUT} > V_{IN}$) while the input and output of the high side switch IC or load switch IC are individually connected to the external power supply. Table 2 in the next page summarizes the recommended products equipped with countermeasure against each concern.

Table 1. Concerns and recommended products for individual input, output, and EN conditions

Conditions			Events		Concerns	Recommended Products		
VIN condition	SW condition EN condition	Relation of VIN and VOUT (VOUT externally applied)	Reverse current (Models without reverse current protection function) ²	Discharge function (Models equipped with discharge function) ³				
OFF (0V)	SW: No operation EN: No operation	$V_{IN} + V_F < V_{OUT}^{*1}$	$V_{OUT} \rightarrow V_{IN}$ Current flows in parasitic diode	Discharge OFF	(1) A reverse current ($I_{REVERSE}$) may flow through the parasitic diode to VIN, causing the deterioration or destruction of the IC.	Use a product equipped with the reverse current protection function.	Table2 (A)	
ON	SW: OFF EN: OFF	$V_{IN} + V_F < V_{OUT}^{*1}$	$V_{OUT} \rightarrow V_{IN}$ Current flows in parasitic diode	Discharge ON Current flows	(1) A reverse current ($I_{REVERSE}$) may flow through the parasitic diode to VIN, causing the deterioration or destruction of the IC. (2) A discharge current (I_{DISC}) increases the power consumption.	Use a product equipped with the reverse current protection function.	To reduce the power consumption, use a product equipped with the reverse current protection function, but without the discharge function.	Table2 (B)
							When it is not necessary to reduce the power consumption	Table2 (A)
ON	SW: OFF EN: OFF	$V_{IN} + V_F > V_{OUT}^{*1}$	Not present	Discharge ON Current flows	(2) A discharge current (I_{DISC}) increases the power consumption.	To reduce the power consumption, use a product without the discharge function.	Table2 (C)	
ON	SW: ON EN: ON	$V_{IN} < V_{OUT}$	$V_{OUT} \rightarrow V_{IN}$ Current flows in the output transistor	Discharge OFF	The switch becomes bidirectional, causing a current flowing to VIN.	No applicable product.	-	

*1 VF is the forward direction voltage of the parasitic diode.

*2 No reverse current flows in the models equipped with the reverse current protection function.

*3 In the models without the discharge function, the phenomenon described in concern (2) does not occur.

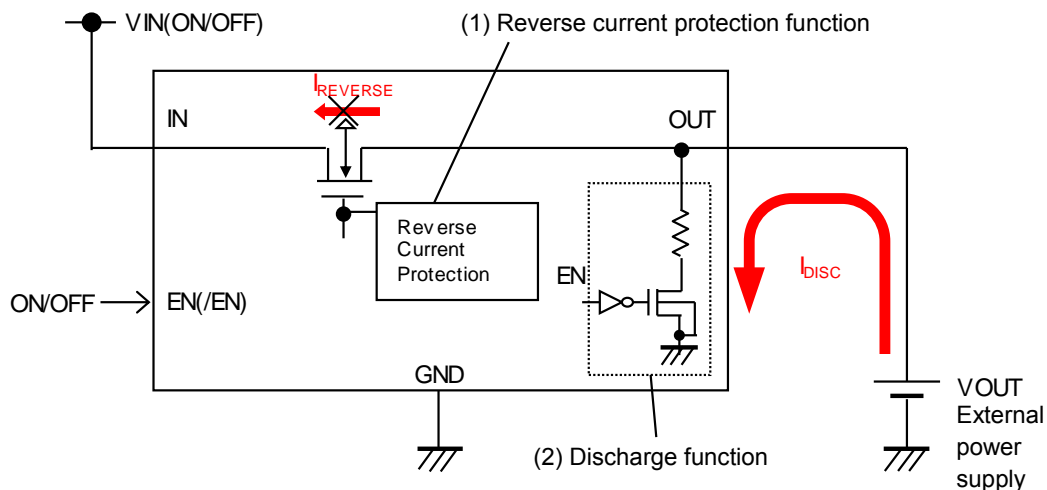


Figure 1. Input, output, and EN terminals and reverse current protection and discharge functions

Table 2. List of products with countermeasures against reverse voltage application

Recommended product		
(A)	Product equipped with reverse protection function	<p>High side switch IC BD2240G, BD2241G, BD2246G, BD2247G, BD2248G, BD2242G, BD2243G, BD2262G-M, BD22621G-M, BD2264G-M, BD22641G-M, BD2265G-M, BD2266G-M, BD2267G-M, BD2244G-M, BD2245G-M, BD82020FVJ, BD82021FVJ, BD82022FVJ, BD82023FVJ, BD82024FVJ, BD82025FVJ, BD82028FVJ, BD82029FVJ, BD82030FVJ, BD82031FVJ, BD82032FVJ, BD82033FVJ, BD82034FVJ, BD82035FVJ, BD2220G, BD2221G, BD2222G, BD2220G-LB, BD2221G-LB, BD2055AFJ, BD2045AFJ, BD6519FJ, BD2051AFJ, BD2041AFJ, BD2065AFJ, BD2061AFJ, BD82065FVJ, BD82061FVJ, BD82065FVJ-LB, BD82061FVJ-LB, BD82006FVJ-M, BD82007FVJ-M, BD2056AFJ, BD2046AFJ, BD6516F, BD6517F, BD2052AFJ, BD2042AFJ, BD2066FJ, BD2062FJ, BD2066FJ-LB, BD2062FJ-LB, BD2068FJ-M, BD2069FJ-M</p> <p>Load switch IC BD6524HFV, BD6528HFV, BD6529GUL, BD2204GUL, BD6522F, BDS2EJAAGUL</p>
(B)	Product equipped with the reverse current protection function, but without the discharge function (when the power consumption should be reduced)	<p>High side switch IC BD2220G, BD2221G, BD2222G, BD2220G-LB, BD2221G-LB, BD2055AFJ, BD2045AFJ, BD6519FJ, BD2051AFJ, BD2041AFJ, BD2065AFJ, BD2061AFJ, BD82065FVJ, BD82061FVJ, BD82065FVJ-LB, BD82061FVJ-LB, BD82006FVJ-M, BD82007FVJ-M, BD2056AFJ, BD2046AFJ, BD6516F, BD6517F, BD2052AFJ, BD2042AFJ, BD2066FJ, BD2062FJ, BD2066FJ-LB, BD2062FJ-LB, BD2068FJ-M, BD2069FJ-M</p> <p>Load switch IC No applicable product.</p>
(C)	Product that is not equipped with the discharge function (when the power consumption should be reduced)	<p>High side switch IC BD2220G, BD2221G, BD2222G, BD2220G-LB, BD2221G-LB, BD2055AFJ, BD2045AFJ, BD6519FJ, BD2051AFJ, BD2041AFJ, BD2065AFJ, BD2061AFJ, BD82065FVJ, BD82061FVJ, BD82065FVJ-LB, BD82061FVJ-LB, BD82006FVJ-M, BD82007FVJ-M, BD2056AFJ, BD2046AFJ, BD6516F, BD6517F, BD2052AFJ, BD2042AFJ, BD2066FJ, BD2062FJ, BD2066FJ-LB, BD2062FJ-LB, BD2068FJ-M, BD2069FJ-M, BD6538G, BD2224G, BD2225G, BD2226G, BD2227G, BD6538G-LB, BD2224G-LB, BD2225G-LB, BD2226G-LB, BD2227G-LB, BD82001FVJ, BD82000FVJ, BD82001FVJ-LB, BD82000FVJ-LB, BD82004FVJ-M, BD82005FVJ-M</p> <p>Load switch IC BD2202G, BD2206G, BD2202G-LB, BD2206G-LB</p>

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