Dear Sirs.

Technical report

Date.

TITLE

Comparison between EXB840 or EXB841 or EXB850 or EXB851 and VLA517-01R

Outline

We developed VLA517-01R as a product corresponding to RoHS regulation of EXB series IGBT drivers. This time, we report as follows because we confirmed that it is an equal characteristic by comparison of VLA517-01R and EXB841 in switching operation and short circuit protection operation.

Conclusion

VLA517-01R is equal to EXB841 that covers ratings and the characteristic of the EXB series, and EXB841 and VLA517-01R are judged that both switching operation and the short-circuit protection operation are equal performances.

Result

The following table is the comparison table about absolute maximum ratings, recommended operating conditions, and electric characteristics.

Absolute Maximum Ratings (at Tc=25degree unless otherwise specified)

Items	Symbol	Conditions	Rated value				
			High speed	Medium speed		High speed	
			VLA517	EXB850	EXB851	EXB840	EXB841
Power supply voltage	Vcc		25V	25V		25V	
Photo coupler input current	Iin		25mA	25mA		25mA	
Forward bias output current	Ig1	PW=2μs、duty=0.05 or less	4.0A	1.5A	4.0A	1.5A	4.0A
Reverse bias output current	Ig2	PW=2μs、duty=0.05 or less	4.0A	1.5A	4.0A	1.5A	4.0A
Isolation voltage	VISO	AC50Hz/60Hz,1min	2500V	2500V		2500V	
Operation temperature	Tc		−25～+85℃	−25～+85℃		−25～+85℃	
Storage temperature	Tstg		−25～125℃	−25～125℃		−25～125℃	

Recommended Operations Conditions

Items	Symbol	Recommended condition		
		High speed type	Mediam speed type	High speed type
		VLA517-01R	EXB850, EXB851	EXB840, EXB841
Power supply voltage	Vcc	20～22V	20～22V	20～22V
Photo Coupler Input Current	Iin	10mA±10%	5mA±10%	10mA±10%

Please adjust the outer resistance to limit Iin to 10mA when it is changed from EXB850 or EXB851 to VLA517.

Electrical Characteristics (Ta=25℃、Vcc=20V、IF=5mA:Medium speed type, IF=10mA:High speed type)

Items	Symbol	Conditions	Rated value					
			VLA517		EXB850、EXB851		EXB840、EXB841	
			Typ.	Max.	Typ.	Max.	Typ.	Max.
Switching time 1	ton			1.5μs		2.0μs		1.5μs
Switching time 2	toff			1.5μs		4.0μs		1.5μs
OCP operating voltage	Vocp		8.5V		8.5V		8.5V	
OCP delay time	tocp			10μs		10μs		10μs
Alarm delay time	tALM			1.5μs		1.5μs		1.5μs
Reverse bias power supply voltage	VRB	IF=0A	5V		5V		5V	
Opto coupler Common mode transient immunity	dv/dt		10000V/μs		P-P,1000V、5000V/μs		P-P,1000V、5000V/μs	

Prepared	K.Yamashita								Document number:
Approved	H.Kamachi '06-5/19								IA — H0198

ISAHAYA ELECTRONICS CORPORATION
Power Semiconductor Technology Center

The comparison result of switching operation

The switching operation confirmed the switching time and the switching loss at turned on and turnoff. There was especially no difference in the characteristic value as shown in the table below. The short-circuit protection operation doesn't have the difference in the characteristic value either.

Measurement results

Table 1 Normal switching operation

			EXB841				VLA517-01R			
RG	Vpn	Ic	ton	Pon	toff	Poff	ton	Pon	toff	Poff
Ω	V	A	μs	mJ	μs	mJ	μs	mJ	μs	mJ
6.1	600	50	0.50	5.8	0.64	3.8	0.48	5.7	0.66	4.0
		100	0.54	10.8	0.61	7.5	0.50	10.3	0.69	7.6
		200	0.68	23.2	0.65	15.6	0.63	20.9	0.67	15.4
	800	200	0.68	33.3	0.68	21.7	0.62	31.1	0.70	21.9
3	600	100					0.4	7.9	0.60	7.6
		200					0.41	16.0	0.62	15.2
	800	200	0.51	23.8	0.6	22.0	0.46	23.6	0.64	21.7

Table 2 Short circuit protection operation Unit:μs

		EXB841	VLA517-01R
RG	VCE	td	td
6.1	600	3.32	3.35
	800	3.40	3.41
3.0	600	3.56	3.72
	800	3.56	3.72

Measurement methods

(1) At the normal switching

P side: It is on minus bias by a sample driver. (input circuit is open)

N side: It drives IGBT by the sample driver.

(2)At the operation of short-circuit protection

Power supply between "P" and "N" is connected directly between the collector emitters of N side element, a single pulse is impressed to N side gate, IGBT is short-circuited in the arm, and the driver's short-circuit detection and the response of the protection operation are confirmed.

Measurement conditions

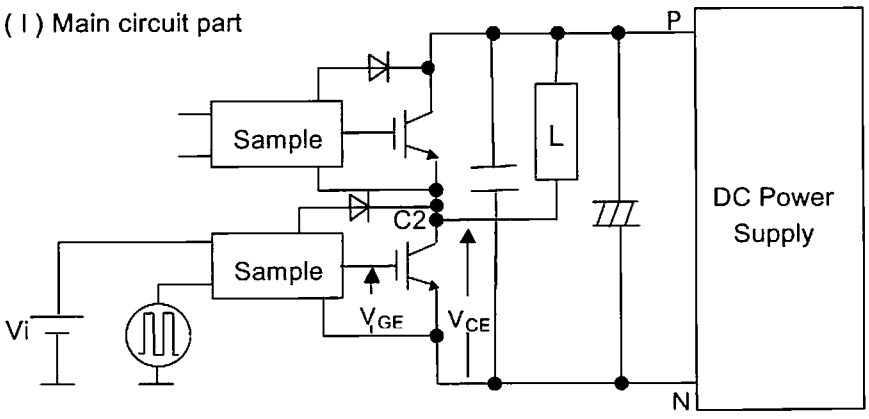
(1) Common condition: Vcc=20V, Vi=15V, Ri=1.5kΩ, and IGBT module: 2MBI200U4B120

(2) The normal switching operation : L load (L=100μH): It connects between P-C2, and input two pulses, these on time is adjustment depend on setting currents.

(3) Short-circuit protection operation: Single pulse input 10μs.

Measurement circuit

(I) Main circuit part



Attention: When the short-circuit protection operates, it connects it directly from P to C2 in above figure.

Definition of measurement item

"ton" is time from reaching to VGE=0V to reaching to VCE=0.1×VPN.

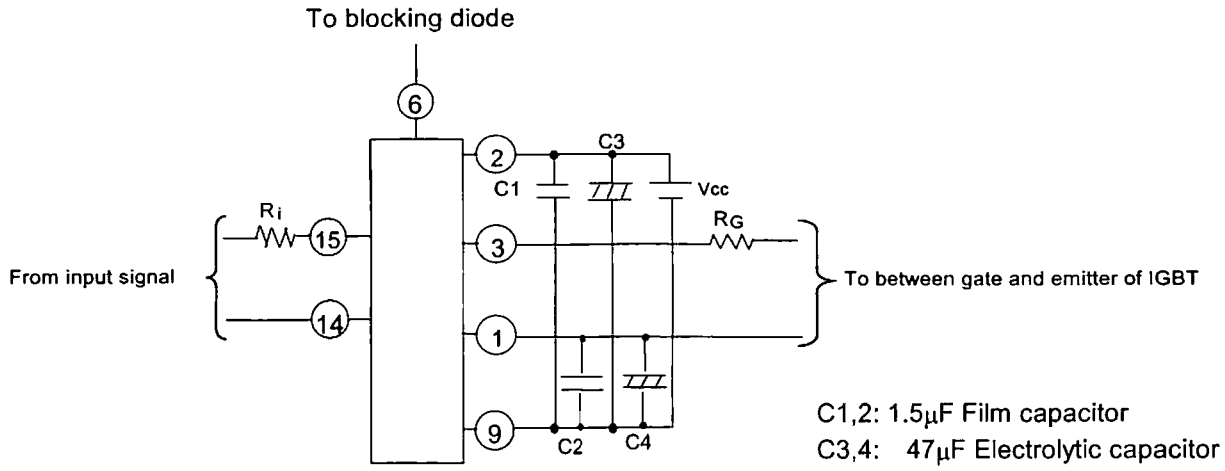
"toff" is time to becoming in Ic=0.1×Ic after it reaches VGE=0.9×Vcc.

On loss "Pon" is defined from Ic=OA (Increase monotonously) as the switching loss of the period of VCE=0V (Decrease monotonously).

Off loss "Poff" is defined from VCE=OV (Increase monotonously) as the switching loss of the period of Ic=0A (Decrease monotonously).

ISAHAYA ELECTRONICS CORPORATION
Power Semiconductor Technology Center

(II) the circuit chart in the sample driver block



Reference

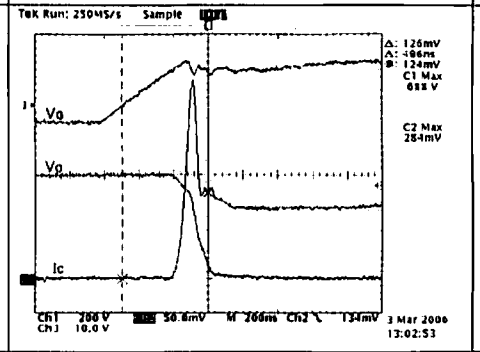
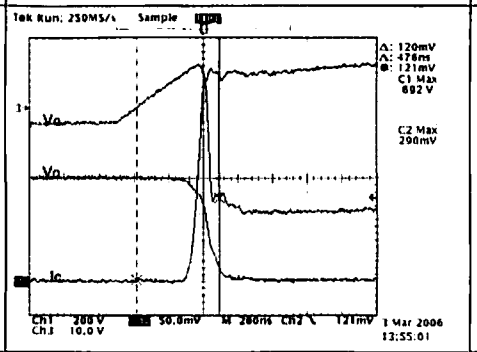
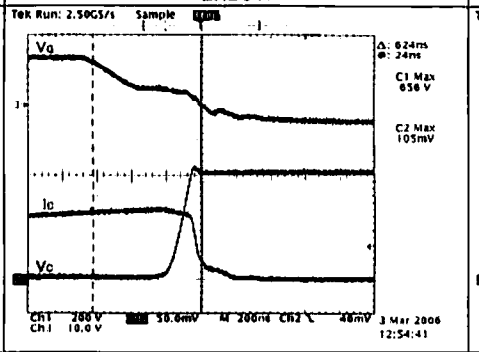
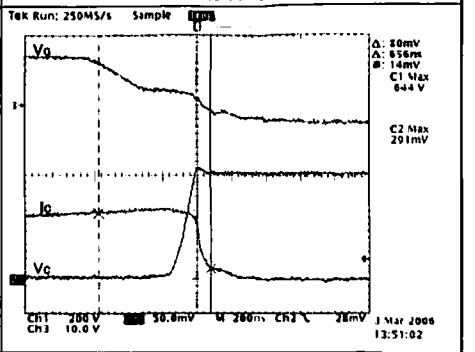
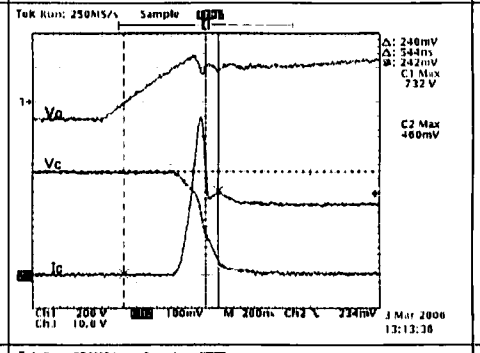
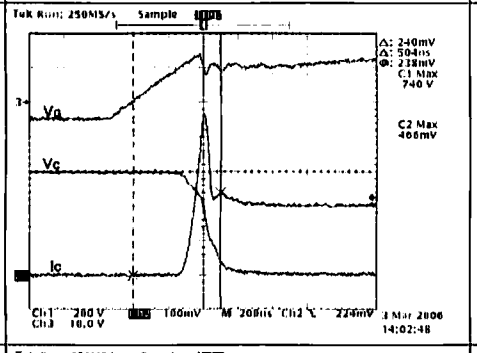
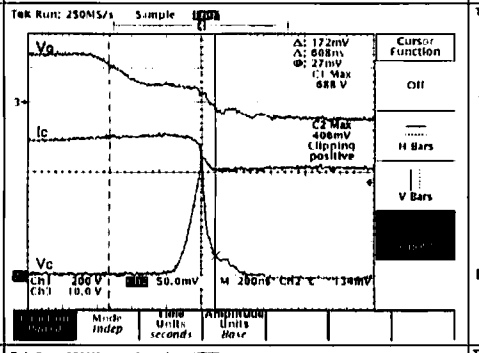
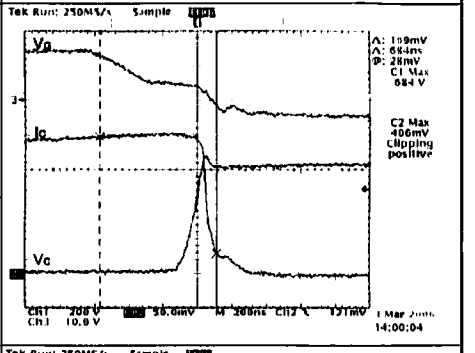
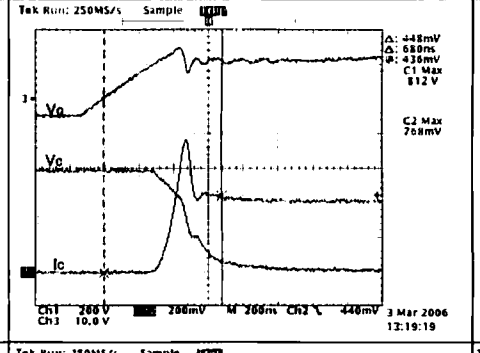
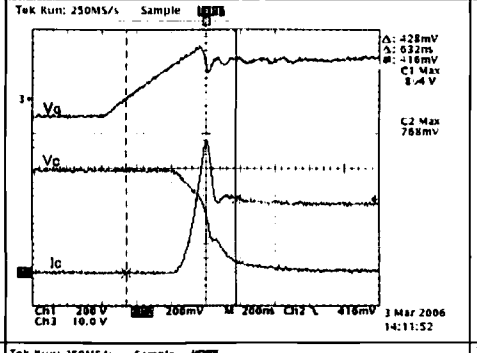
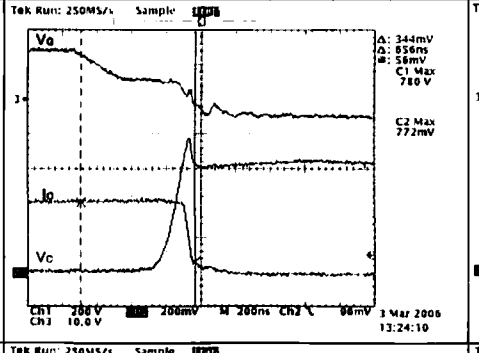
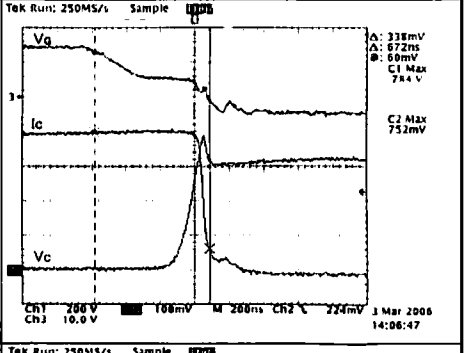
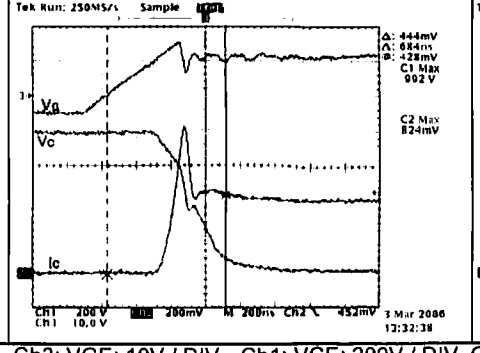
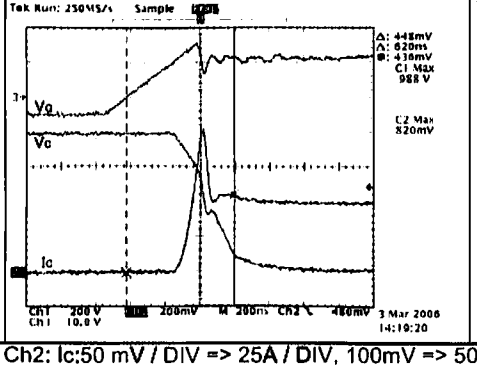
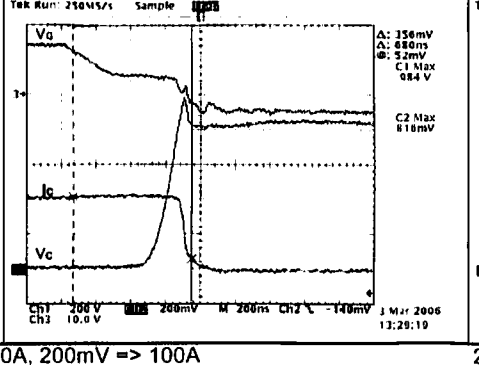
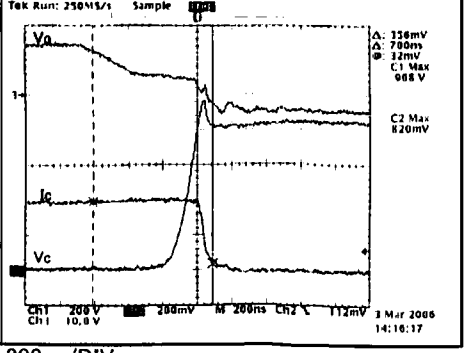
It can be read that there are no differences in EXB841 and VLA517-01R according to the following attached appendix documents.

Appendix 1: Comparison of waveforms between EXB841 and VLA517-01R, at normal switching (RG=6.1Ω)
Appendix 2: Comparison of waveforms between EXB841 and VLA517-01R, at normal switching (RG=3.0Ω)
Appendix 3: Comparison of waveforms between EXB841 and VLA517-01R, at short-circuit protection.

ISAHAYA ELECTRONICS CORPORATION
Power Semiconductor Technology Center

Appendix 1 : Comparison of waveforms between EXB841and VLA517-01R, when Rating current switching operations. 2006. 3. 3.

Measurement conditions:Vcc=20V、 Vi=15V、 Ri=1.5kΩ、f=10kHz、ton is adjustment to depend on setting collector current(L=100μH), IGBTmodule;2MBI200U4B120、P side:normaly off, N side;duble pulse switching.

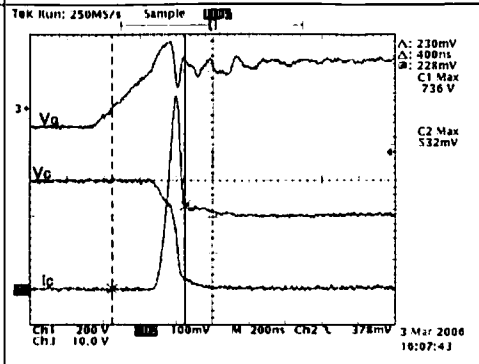
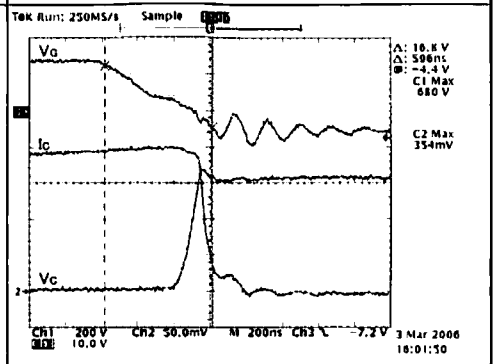
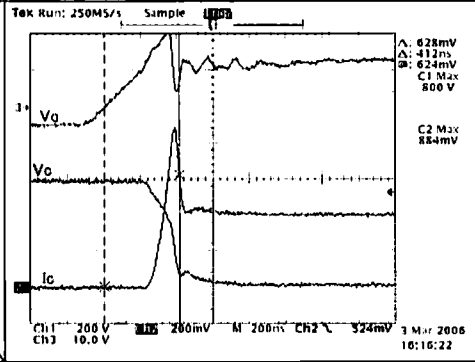
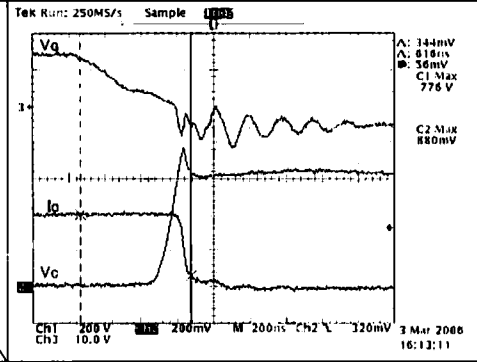
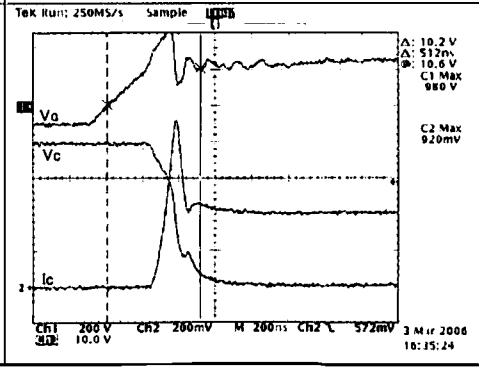
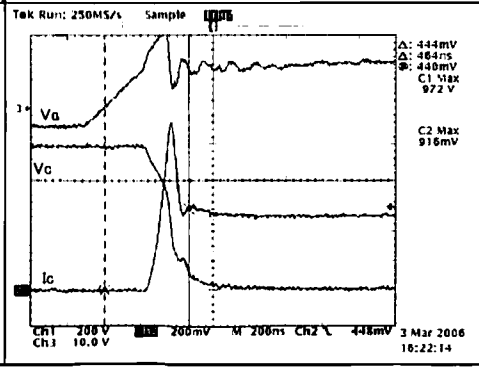
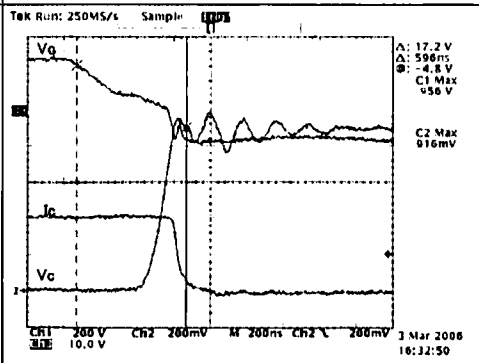
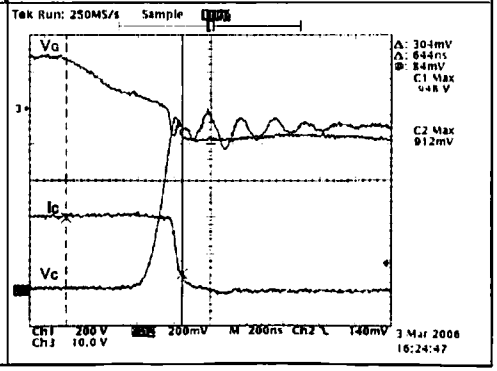
RG=6. 1Ω		At turn on		At turn off	
VPN	Ic	EXB841	VLA517-01R	EXB841	VLA517-01R
600	50				
	100				
	200				
800	200				

Ch3: VGE: 10V / DIV, Ch1: VCE: 200V / DIV, Ch2: Ic:50 mV / DIV => 25A / DIV, 100mV => 50A, 200mV => 100A

200ns/DIV

Appendix 2 : Comparison of waveforms between EXB841and VLA517-01R, when Rating current switching operations. 2006. 3. 3.

Measurement conditions:Vcc=20V、 Vi=15V、 Ri=1.5kΩ、f=10kHz、ton is adjustment to depend on setting collector current(L=100μH), IGBTmodule;2MBI200U4B120、P side:normaly off, N side;two pulse switching.

RG=3Ω		At turn on		At turn off	
VPN	Ic	EXB841	VLA517-01R	EXB841	VLA517-01R
600	100				
	200				
800	200				

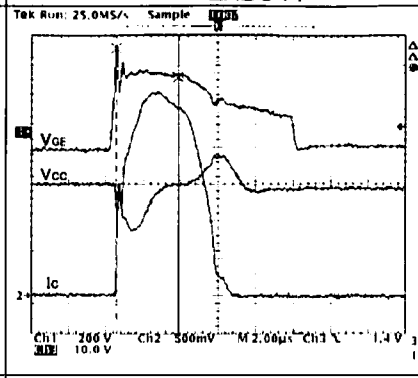
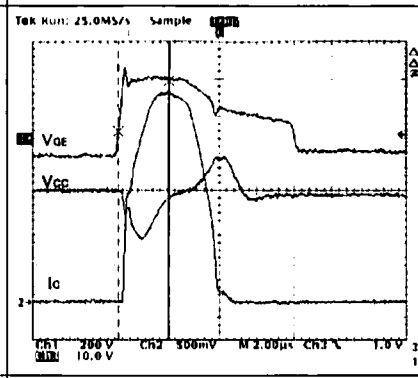
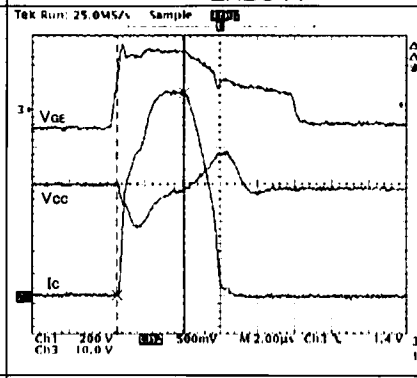
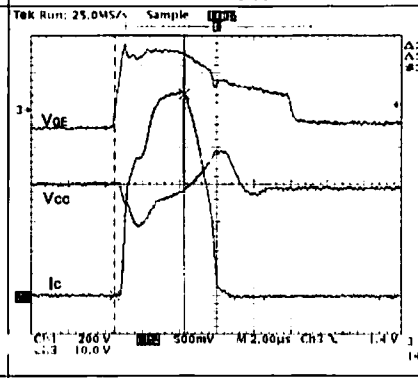
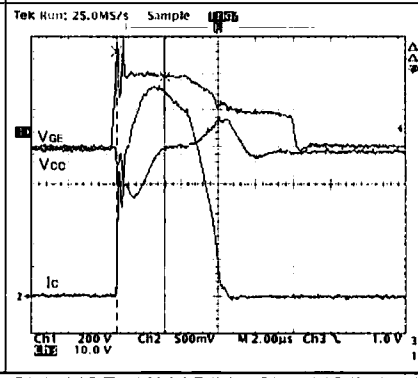
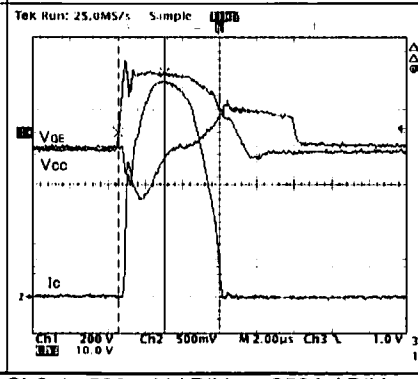
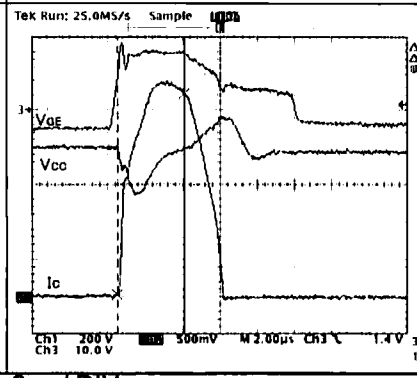
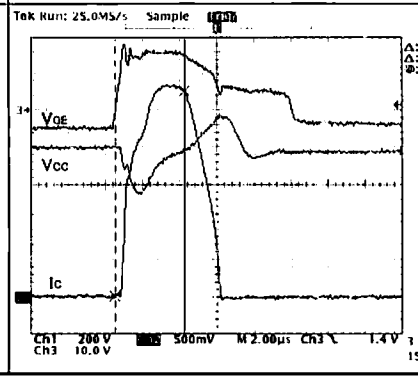
Ch3: VGE: 10V / DIV, Ch1: VCE: 200V / DIV, Ch2: Ic:50 mV / DIV => 25A / DIV, 100mV => 50A, 200mV => 100A

200ns/DIV

Appendix 3：Comparison of waveforms between EXB841and VLA517-01R, when Short-circuit protectetion is operating.

2006. 3. 3.

Measurement conditions:Vcc=20V、 Vi=15V、 Ri=1.5kΩ、ton＝10μs、IGBTmodule;2MBI200U4B120、P-N voltage is dilectory connectted to between collector and emitter of IGBT module;Arm short circuit test.

RG	3Ω		6Ω	
VPN	EXB841	VLA517-01R	EXB841	VLA517-01R
600				
800				

Ch3: VGE: 10V / DIV, Ch1: VCE: 200V / DIV, Ch2: Ic:500 mV / DIV => 250A / DIV　　2μs / DIV