

TEST DATA OF DHS50B28

Regulated DC Power Supply
May 22, 2009

Approved by : Tatsuya Mano
Tatsuya Mano Design Manager

Prepared by : Shuuhei Sawada
Shuuhei Sawada Design Engineer

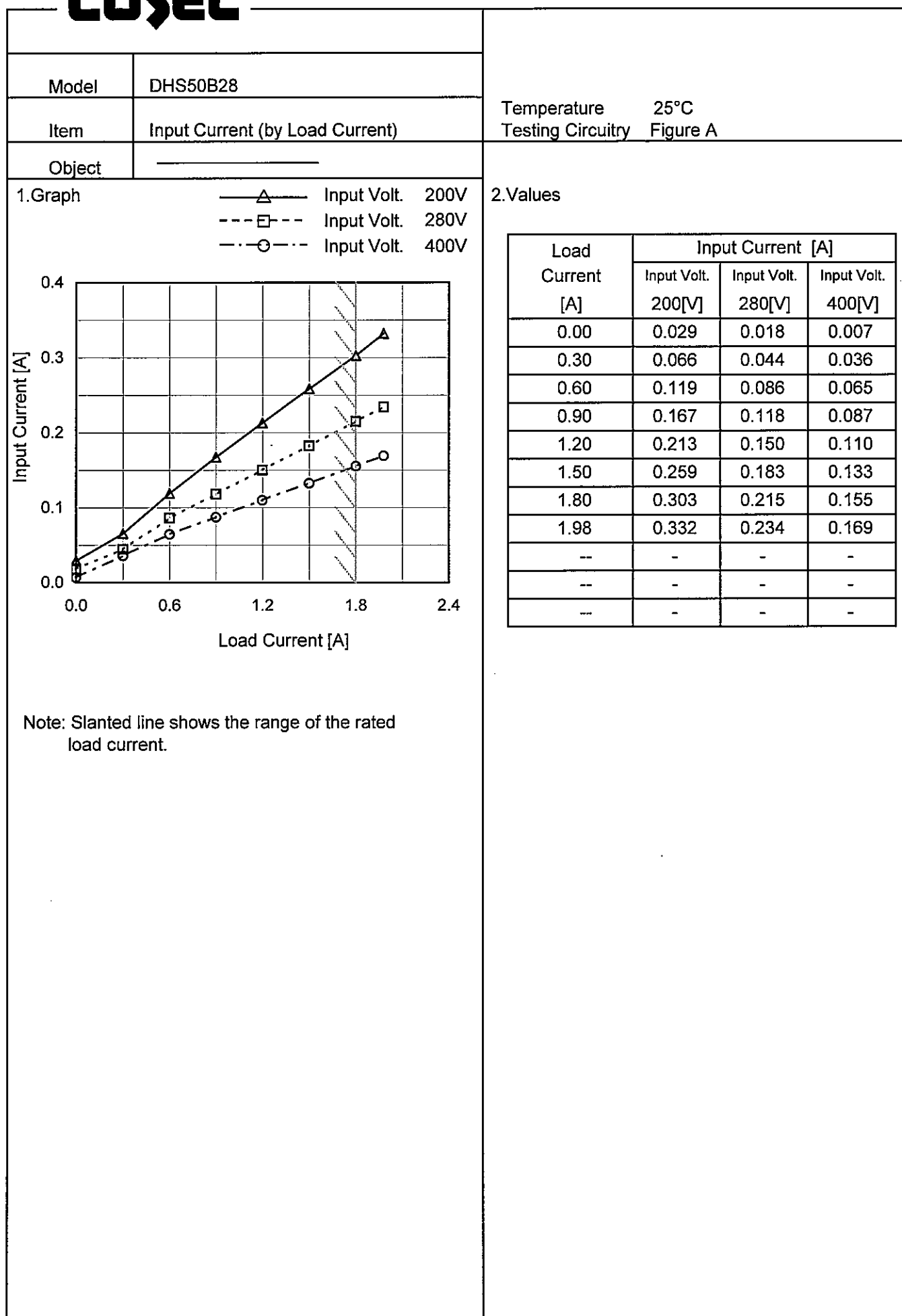
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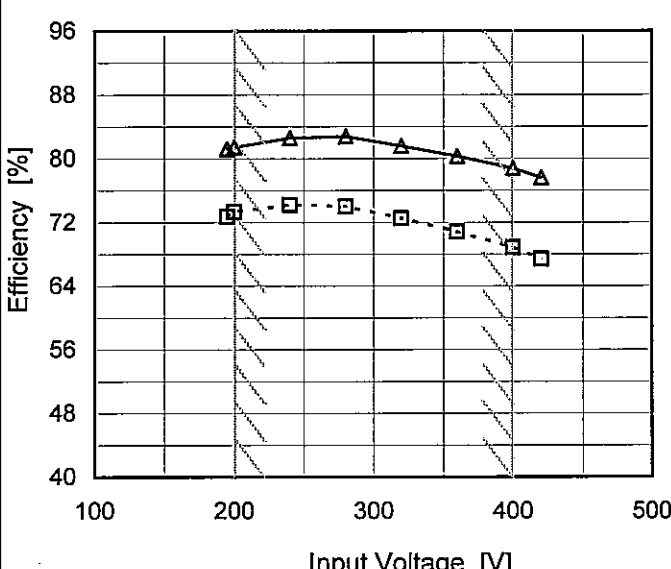
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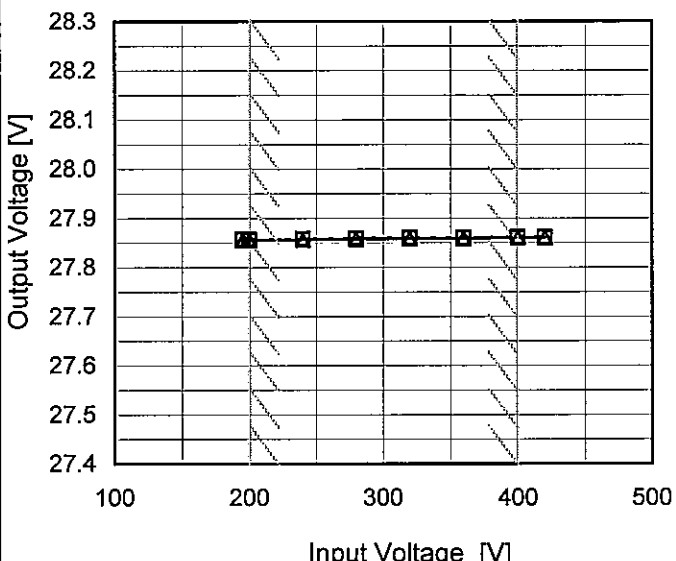
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Model		DHS50B28	Temperature		25°C																																																			
Item		Input Power (by Load Current)	Testing Circuitry		Figure A																																																			
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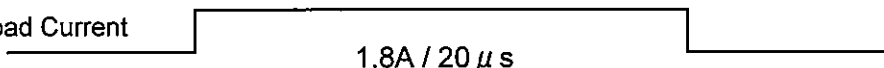
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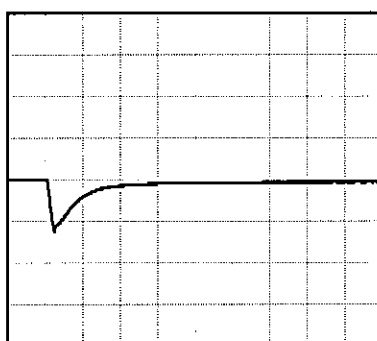
Model	DHS50B28	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+28V1.8A		

Input Volt. 280 V
Cycle 1000 ms

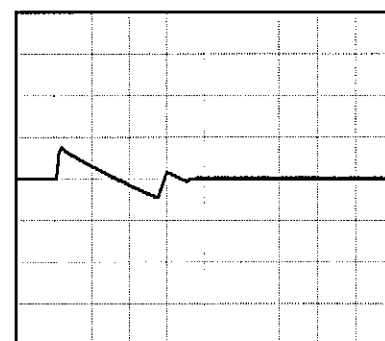
Load Current  1.8A / 20 µs

Min. Load (0A) \longleftrightarrow
Load 100% (1.8A)

500mV/div



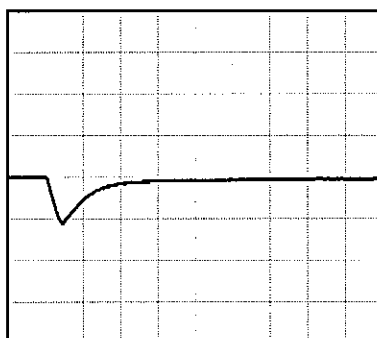
200 µ s/div



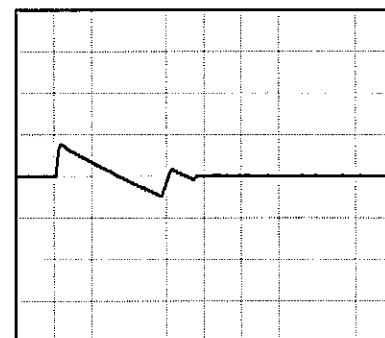
2 ms/div

Min. Load (0A) \longleftrightarrow
Load 50% (0.9A)

500mV/div



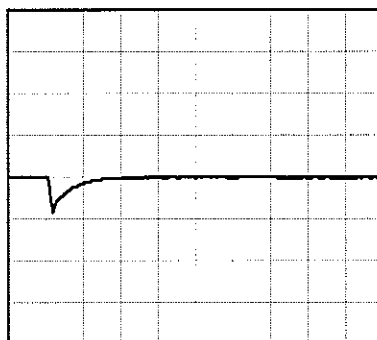
200 µ s/div



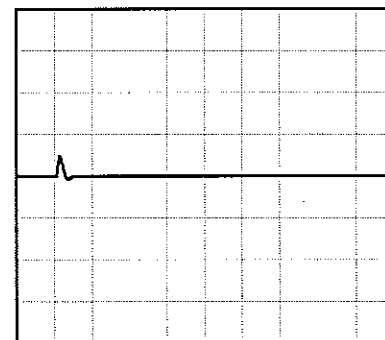
2 ms/div

Load 10% (0.18A) \longleftrightarrow
Load 100% (1.8A)

500mV/div



200 µ s/div



2 ms/div

Model		DHS50B28	
Item		Ripple Voltage (by Load Current)	
Object		+28V1.8A	
1.Graph		2.Values	

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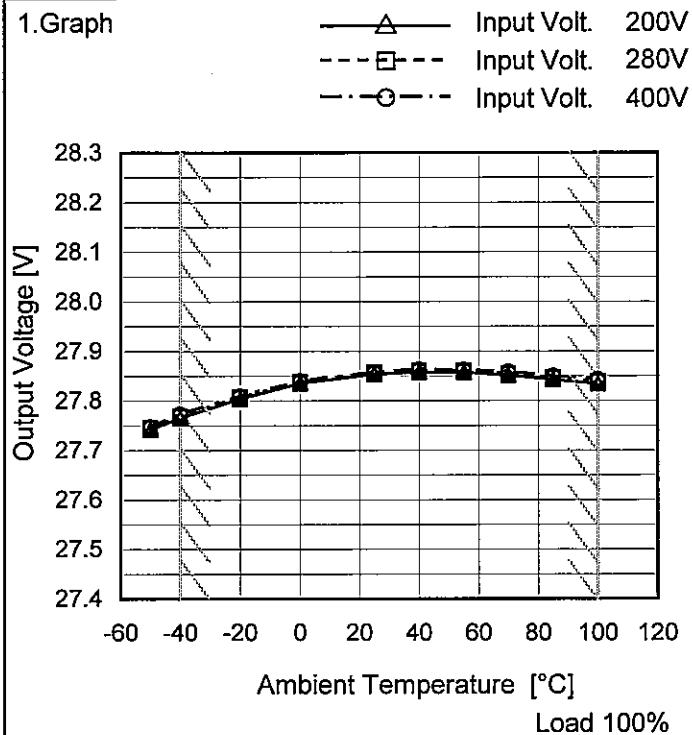
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<div><div><div><div></div><div>Input Volt. 200V</div></div><div><div></div><div>Input Volt. 400V</div></div></div><div><table><thead><tr><th>Load Current [A]</th><th>Input Volt. 200 [V]</th><th>Input Volt. 400 [V]</th></tr></thead><tbody><tr><td>0.00</td><td>20</td><td>35</td></tr><tr><td>0.30</td><td>40</td><td>55</td></tr><tr><td>0.60</td><td>40</td><td>60</td></tr><tr><td>0.90</td><td>45</td><td>60</td></tr><tr><td>1.20</td><td>45</td><td>60</td></tr><tr><td>1.50</td><td>45</td><td>60</td></tr><tr><td>1.80</td><td>45</td><td>65</td></tr><tr><td>1.98</td><td>45</td><td>65</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table></div></div> <div><div>Measured by 100 MHz Oscilloscope.</div><div>Ripple-Noise is shown as p-p in the figure below.</div><div>Note: Slanted line shows the range of the rated load current.</div></div> <div><div><div><div></div><div>Ripple Noise[mVp-p]</div></div><div></div></div><div>Fig.Complex Ripple Noise Wave Form</div></div>		Load Current [A]	Input Volt. 200 [V]	Input Volt. 400 [V]	0.00	20	35	0.30	40	55	0.60	40	60	0.90	45	60	1.20	45	60	1.50	45	60	1.80	45	65	1.98	45	65	--	-	-	--	-	-	--	-	-	<table><thead><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple-Noise [mV]</th></tr><tr><th>Input Volt. 200 [V]</th><th>Input Volt. 400 [V]</th></tr></thead><tbody><tr><td>0.00</td><td>20</td><td>35</td></tr><tr><td>0.30</td><td>40</td><td>55</td></tr><tr><td>0.60</td><td>40</td><td>60</td></tr><tr><td>0.90</td><td>45</td><td>60</td></tr><tr><td>1.20</td><td>45</td><td>60</td></tr><tr><td>1.50</td><td>45</td><td>60</td></tr><tr><td>1.80</td><td>45</td><td>65</td></tr><tr><td>1.98</td><td>45</td><td>65</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table>		Load Current [A]	Ripple-Noise [mV]		Input Volt. 200 [V]	Input Volt. 400 [V]	0.00	20	35	0.30	40	55	0.60	40	60	0.90	45	60	1.20	45	60	1.50	45	60	1.80	45	65	1.98	45	65	--	-	-	--	-	-	--	-	-
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Model	DHS50B28																																								
Item	Ripple Voltage (by Ambient Temp.)	Testing Circuitry Figure B																																							
Object	+28V1.8A																																								
1.Graph		2.Values																																							
<div><div><div>---□---</div><div>△---</div></div><div>Load 50%</div><div>Load 100%</div></div> <p>Ripple Voltage [mV]</p> <p>Ambient Temperature [°C]</p> <p>Input Volt. 280V</p>		<table><tr><th rowspan="2">Ambient Temperature [°C]</th><th colspan="2">Ripple Voltage [mV]</th></tr><tr><th>Load 50%</th><th>Load 100%</th></tr><tr><td>-50</td><td>60</td><td>65</td></tr><tr><td>-40</td><td>60</td><td>65</td></tr><tr><td>-20</td><td>60</td><td>60</td></tr><tr><td>0</td><td>60</td><td>60</td></tr><tr><td>25</td><td>50</td><td>55</td></tr><tr><td>40</td><td>50</td><td>55</td></tr><tr><td>55</td><td>50</td><td>55</td></tr><tr><td>70</td><td>50</td><td>55</td></tr><tr><td>85</td><td>50</td><td>55</td></tr><tr><td>100</td><td>55</td><td>60</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Ambient Temperature [°C]	Ripple Voltage [mV]		Load 50%	Load 100%	-50	60	65	-40	60	65	-20	60	60	0	60	60	25	50	55	40	50	55	55	50	55	70	50	55	85	50	55	100	55	60	--	-	-
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Note: Slanted line shows the range of the rated ambient temperature.																																									

Model	DHS50B28
Item	Ambient Temperature Drift
Object	+28V1.8A

Testing Circuitry Figure A

1. Graph



Note: Slanted line shows the range of the rated ambient temperature.

2. Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
-50	27.742	27.746	27.748
-40	27.766	27.769	27.774
-20	27.804	27.808	27.810
0	27.836	27.838	27.840
25	27.854	27.858	27.859
40	27.858	27.861	27.863
55	27.858	27.861	27.863
70	27.852	27.855	27.859
85	27.843	27.847	27.851
100	27.835	27.839	27.844
--	-	-	-

COSEL

		Testing Circuitry Figure A
Model	DHS50B28	
Item	Output Voltage Accuracy	
Object	+28V1.8A	

1. Output Voltage Accuracy

This is defined as the value of the output voltage, regulation load, ambient temperature and input voltage varied at random in the range as specified below.

Temperature : -40 - 100°C

Input Voltage : 200 - 400V

Load Current : 0 - 1.8A

* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

* Output Voltage Accuracy (Ratio) = $\frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$

2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	55	400	0	27.885	±60	±0.2
Minimum Voltage	-40	200	1.8	27.766		

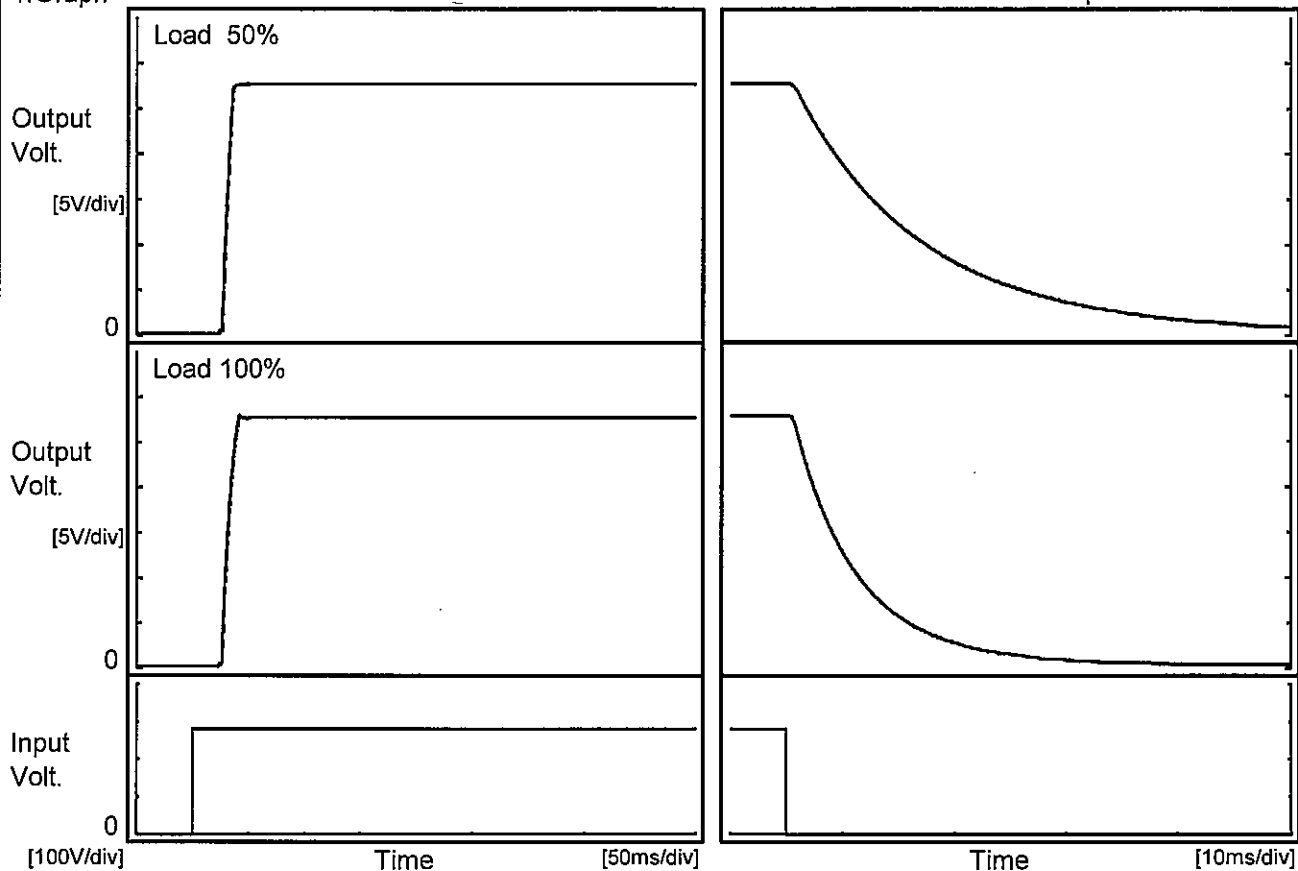
COSEL

Model	DHS50B28		
Item	Time Lapse Drift	Temperature	25°C
		Testing Circuitry	Figure A
Object	+28V1.8A		
1.Graph		2.Values	
<div><div><div>Output Voltage [V]</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></di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COSEL

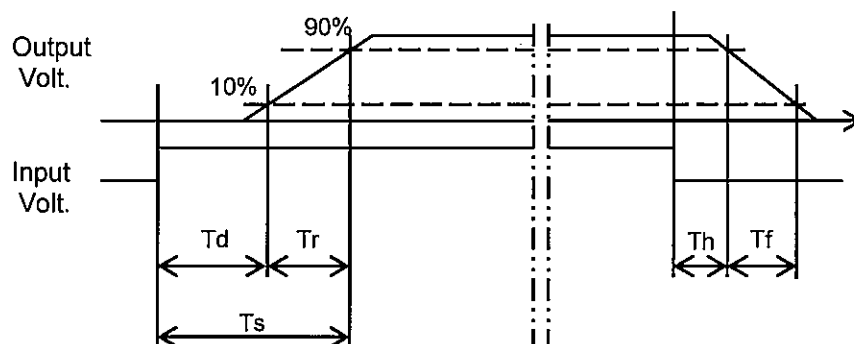
Model	DHS50B28	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+28V1.8A		

1. Graph



2. Values

		[ms]				
Load	Time	Td	Tr	Ts	Th	Tf
50 %		26.8	8.3	35.1	3.2	52.3
100 %		26.8	11.5	38.3	2.2	26.5



Model	DHS50B28																																						
Item	Minimum Input Voltage for Regulated Output Voltage	Testing Circuitry Figure A																																					
Object	+28V1.8A																																						
1.Graph		2.Values																																					
<div><div><div>---□---</div><div>Load 50%</div></div><div><div>—△—</div><div>Load 100%</div></div></div> <table><thead><tr><th>Ambient Temperature [°C]</th><th>Load 50% [V]</th><th>Load 100% [V]</th></tr></thead><tbody><tr><td>-50</td><td>166</td><td>173</td></tr><tr><td>-40</td><td>166</td><td>173</td></tr><tr><td>-20</td><td>168</td><td>175</td></tr><tr><td>0</td><td>170</td><td>177</td></tr><tr><td>25</td><td>172</td><td>179</td></tr><tr><td>40</td><td>173</td><td>180</td></tr><tr><td>55</td><td>174</td><td>181</td></tr><tr><td>70</td><td>174</td><td>181</td></tr><tr><td>85</td><td>174</td><td>181</td></tr><tr><td>100</td><td>173</td><td>181</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table>		Ambient Temperature [°C]	Load 50% [V]	Load 100% [V]	-50	166	173	-40	166	173	-20	168	175	0	170	177	25	172	179	40	173	180	55	174	181	70	174	181	85	174	181	100	173	181	--	-	-		
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Note: Slanted line shows the range of the rated ambient temperature.																																							

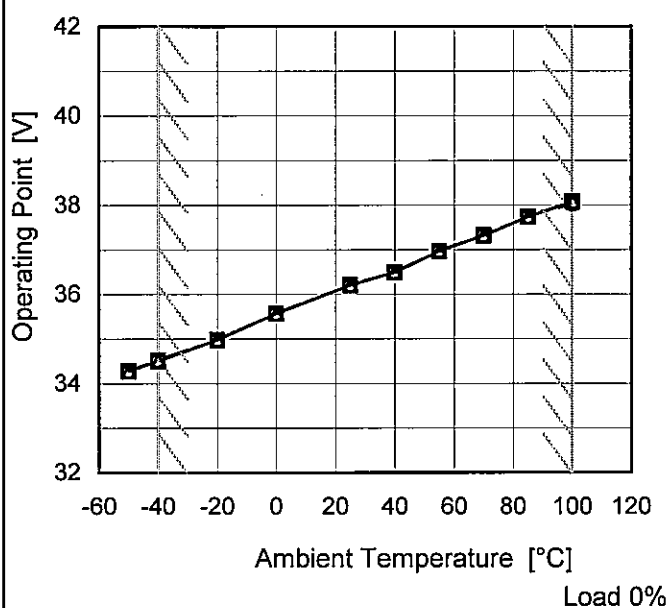
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Model	DHS50B28																																																									
Item	Overcurrent Protection	Temperature	25°C																																																							
Object	+28V1.8A	Testing Circuitry	Figure A																																																							
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<div><div><div></div>Input Volt. 200V</div><div><div></div>Input Volt. 280V</div><div><div></div>Input Volt. 400V</div></div> <p>Note: Slanted line shows the range of the rated load current.</p> <p>Intermittent operation occurs when the output voltage is from 14V to 0V.</p>		<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="3">Load Current [A]</th></tr><tr><th>Input Volt. 200[V]</th><th>Input Volt. 280[V]</th><th>Input Volt. 400[V]</th></tr><tr><td>28.0</td><td>1.81</td><td>1.80</td><td>1.80</td></tr><tr><td>26.6</td><td>2.19</td><td>2.27</td><td>2.40</td></tr><tr><td>25.2</td><td>2.23</td><td>2.30</td><td>2.42</td></tr><tr><td>22.4</td><td>2.29</td><td>2.37</td><td>2.47</td></tr><tr><td>19.6</td><td>2.35</td><td>2.40</td><td>2.49</td></tr><tr><td>16.8</td><td>2.38</td><td>2.41</td><td>2.50</td></tr><tr><td>14.0</td><td>2.37</td><td>2.45</td><td>2.47</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Output Voltage [V]	Load Current [A]			Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]	28.0	1.81	1.80	1.80	26.6	2.19	2.27	2.40	25.2	2.23	2.30	2.42	22.4	2.29	2.37	2.47	19.6	2.35	2.40	2.49	16.8	2.38	2.41	2.50	14.0	2.37	2.45	2.47	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Model	DHS50B28
Item	Overvoltage Protection
Object	+28V1.8A

1.Graph

—△— Input Volt. 200V
 ---□--- Input Volt. 280V
 -·-○-·- Input Volt. 400V



Note: Slanted line shows the range of the rated ambient temperature.

Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Operating Point [V]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
-50	34.28	34.28	34.28
-40	34.51	34.52	34.52
-20	34.98	34.98	34.98
0	35.57	35.57	35.57
25	36.21	36.21	36.21
40	36.50	36.50	36.50
55	36.97	36.97	36.97
70	37.32	37.32	37.32
85	37.74	37.74	37.74
100	38.08	38.08	38.03
--	-	-	-

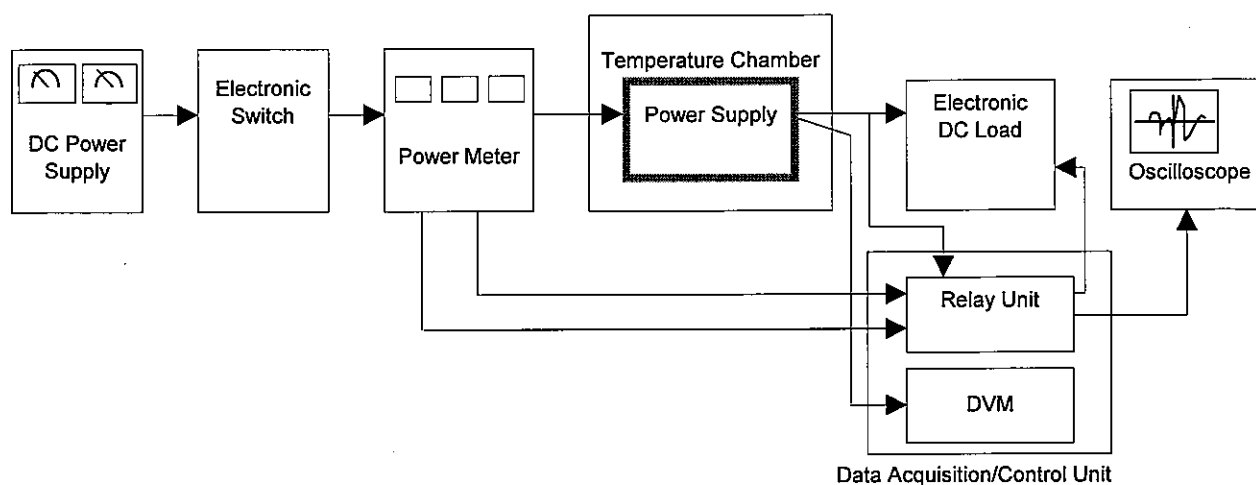


Figure A

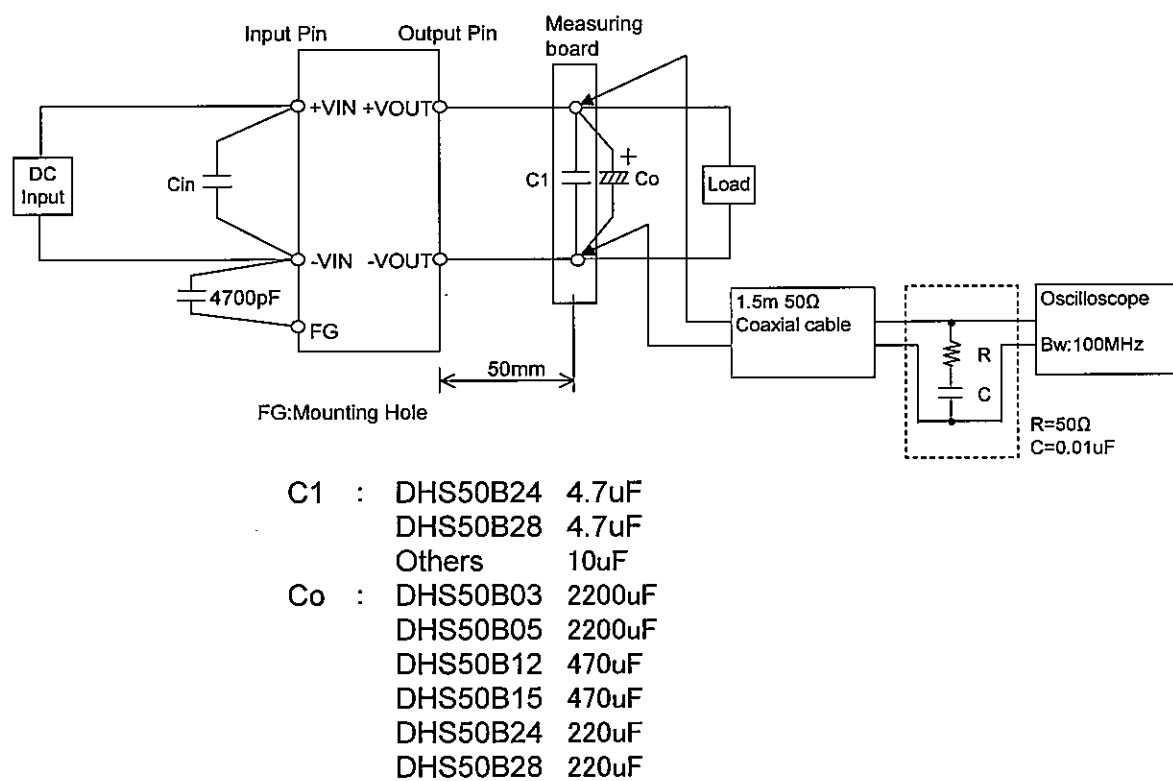


Figure B