|  |  |  |
| --- | --- | --- |
| **Doc. No.** |  |  |
| **Equipment Type** | 9 kW SMPS Low Power Test Setup | |

|  |  |  |
| --- | --- | --- |
| **Sr. No.** | **Topic** | **Page No.** |
| 1. | Introduction | 2 |
| 2. | Result Data Table | 3 |
| 3. | Result Data Pictures | 4 |

**Introduction:**

The following circuit was established in low power in the shop floor located in the ground floor of the R&D building to test the feasibility of a current fed converter. Since, components from the 4.5kW RBC cum 2.5kW EBC were easily available, these components where used to realize this setup.

Lin

D1

D2

T1 T3 D3

HF TX D4

Cf Rload

Cs1 Cs2

D5

D6

T2 T4 D7

D8

The following components were used:

1. 1 x DSP Main Control Card – Hirect HRT 1302
2. 1 x Interface Card – Hirect HRT 1301
3. 4 x Gate Driver Card – Semikron Skyper 32
4. 2 x Zener Protection Card – Hirect HR - 333/R1
5. 1 x Regulated DC Power supply – Aplab LD3202 (0-32Vdc, 0-2A)
6. 1 x Input Choke – Hirect TDA-6520 (40µF, 25A @ 15kHz)
7. 2 x IGBT – Semikron Semitrans SKM75GB063D (600V, 75A)
8. 2 x Snubber Capacitors – El-Ci-Ar MP71 (1µF, 1250V)
9. 1 x High Frequency Transformer – Hirect TDA-6523 (2.5kW, 2:1, 15kHz)
10. 4 x Fast Diode – IXYS DSEI2X101-12A (1200V, 99A, 40ns trr)
11. 1 x DC Filter Capacitor – Hirect HRL/RBC/OFP/01 RBC Output Filter Card (4.4mF)
12. 2 x Load Resistor – KWK KHA100 (50Ω & 500Ω each)

The converter was switched at 15kHz square wave pulse in the same way as mentioned in the simulation document. It was supplied 10V from the regulated dc power supply. As soon as it was loaded, the input voltage fell to 6.2Vdc and remained the same. The voltage across the load was measured to be 6.573Vdc throughout this condition. The current sourced from the regulated dc power supply was observed to figure out if the converter could load higher amount of current with higher overlapping of the top and bottom switches of the same leg. The Semikron Skyper 32 gate driver is a dual channel gate driver and it was forcing to turn off the bottom switch as soon as the both the switches turn on at the same time. This was bypassed by using 4 separate gate drivers, using only 1 channel and completely turning off the other channel.

**Result Data Table:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No.** | **Duty Cycle** | **Input Voltage** | **Input Current** |
| 1. | 50% | 6.2V | 0.06A |
| 2. | 51% | 6.2V | 0.54A |
| 3. | 52% | 6.2V | 0.69A |
| 4. | 53% | 6.2V | 0.69A |
| 5. | 54% | 6.2V | 0.69A |
| 6. | 55% | 6.2V | 0.68A |
| 7. | 56% | 6.2V | 0.68A |
| 8. | 57% | 6.2V | 0.68A |
| 9. | 58% | 6.2V | 0.68A |
| 10. | 59% | 6.2V | 0.68A |
| 11. | 60% | 6.2V | 0.69A |
| 12. | 61% | 6.2V | 0.69A |
| 13. | 62% | 6.2V | 0.69A |
| 14. | 63% | 6.2V | 0.70A |
| 15. | 64% | 6.2V | 0.72A |
| 16. | 65% | 6.2V | 0.77A |
| 17. | 66% | 6.2V | 0.82A |
| 18. | 67% | 6.2V | 0.87A |
| 19. | 68% | 6.2V | 0.93A |
| 20. | 69% | 6.2V | 0.99A |
| 21. | 70% | 6.2V | 1.06A |
| 22. | 71% | 6.2V | 1.14A |
| 23. | 72% | 6.2V | 1.23A |
| 24. | 73% | 6.2V | 1.33A |
| 25. | 74% | 6.2V | 1.44A |
| 26. | 75% | 6.2V | 1.57A |
| 27. | 76% | 6.2V | 1.71A |
| 28. | 77% | 6.2V | 1.87A |
| 29. | 78% | 6.2V | 2.06A |
| 30. | 79% | 6.2V | 2.28A |
| 31. | 80% | 6.0V | 2.44A |

**Result Data Pictures:**

|  |  |
| --- | --- |
| Duty = 50%, Vin = 6.2V, Iin = 0.06A | Remark |
| C:\Users\Sourjya Mondal\AppData\Local\Microsoft\Windows\INetCache\Content.Word\IMG-4381.jpg |  |
| Duty = 51%, Vin = 6.2V, Iin = 0.54A | Remark |
| C:\Users\Sourjya Mondal\AppData\Local\Microsoft\Windows\INetCache\Content.Word\IMG-4382.jpg |  |
| Duty = 52%, Vin = 6.2V, Iin = 0.69A | Remark |
| IMG-4383 |  |
| Duty = 53%, Vin = 6.2V, Iin = 0.69A | Remark |
| IMG-4384 |  |

|  |  |
| --- | --- |
| Duty = 54%, Vin = 6.2V, Iin = 0.69A | Remark |
| IMG-4385 |  |
| Duty = 55%, Vin = 6.2V, Iin = 0.68A | Remark |
| IMG-4386 |  |

|  |  |
| --- | --- |
| Duty = 56%, Vin = 6.2V, Iin = 0.68A | Remark |
| IMG-4387 |  |
| Duty = 57%, Vin = 6.2V, Iin = 0.68A | Remark |
| IMG-4388 |  |

|  |  |
| --- | --- |
| Duty = 58%, Vin = 6.2V, Iin = 0.68A | Remark |
| IMG-4390 |  |
| Duty = 59%, Vin = 6.2V, Iin = 0.68A | Remark |
| IMG-4391 |  |

|  |  |
| --- | --- |
| Duty = 60%, Vin = 6.2V, Iin = 0.69A | Remark |
| IMG-4392 |  |
| Duty = 61%, Vin = 6.2V, Iin = 0.69A | Remark |
| C:\Users\Sourjya Mondal\AppData\Local\Microsoft\Windows\INetCache\Content.Word\IMG-4392.jpg |  |

|  |  |
| --- | --- |
| Duty = 62%, Vin = 6.2V, Iin = 0.69A | Remark |
| IMG-4395 |  |
| Duty = 63%, Vin = 6.2V, Iin = 0.70A | Remark |
| IMG-4397 |  |

|  |  |
| --- | --- |
| Duty = 64%, Vin = 6.2V, Iin = 0.72A | Remark |
| IMG-4398 |  |
| Duty = 65%, Vin = 6.2V, Iin = 0.77A | Remark |
| IMG-4399 |  |

|  |  |
| --- | --- |
| Duty = 66%, Vin = 6.2V, Iin = 0.82A | Remark |
| IMG-4400 |  |
| Duty = 67%, Vin = 6.2V, Iin = 0.87A | Remark |
| IMG-4401 |  |

|  |  |
| --- | --- |
| Duty = 68%, Vin = 6.2V, Iin = 0.93A | Remark |
| IMG-4402 |  |
| Duty = 69%, Vin = 6.2V, Iin = 0.99A | Remark |
| IMG-4405 |  |

|  |  |
| --- | --- |
| Duty = 70%, Vin = 6.2V, Iin = 1.06A | Remark |
| IMG-4406 |  |
| Duty = 71%, Vin = 6.2V, Iin = 1.14A | Remark |
| IMG-4407 |  |

|  |  |
| --- | --- |
| Duty = 72%, Vin = 6.2V, Iin = 1.23A | Remark |
| IMG-4408 |  |
| Duty = 73%, Vin = 6.2V, Iin = 1.33A | Remark |
| IMG-4409 |  |

|  |  |
| --- | --- |
| Duty = 74%, Vin = 6.2V, Iin = 1.44A | Remark |
| IMG-4410 |  |
| Duty = 75%, Vin = 6.2V, Iin = 1.57A | Remark |
| IMG-4411 |  |

|  |  |
| --- | --- |
| Duty = 76%, Vin = 6.2V, Iin = 1.71A | Remark |
| IMG-4412 |  |
| Duty = 77%, Vin = 6.2V, Iin = 1.87A | Remark |
| C:\Users\Sourjya Mondal\AppData\Local\Microsoft\Windows\INetCache\Content.Word\IMG-4413.jpg |  |

|  |  |
| --- | --- |
| Duty = 78%, Vin = 6.2V, Iin = 2.06A | Remark |
| IMG-4414 |  |
| Duty = 79%, Vin = 6.2V, Iin = 2.28A | Remark |
| IMG-4417 |  |