LID Rev 4.4 LdC Choice

| | | | Rload High | 5000 | | | Rload Med | 2500 | | | Rload Low | 500 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vout | Duty Cycle | Vg | Vc1 | Vc2 | Il1 | Il2 | Vc1 | Vc2 | Il1 | Il2 | Vc1 | Vc2 | Il1 | Il2 |
| 5000 | 0 | 5000.00000 | 5000.000 | 5000.000 | 1.0000 | 1.0000 | 5000.000 | 5000.000 | 2.0000 | 2.0000 | 5000.000 | 5000.000 | 10.0000 | 10.0000 |
| 5000 | 0.1 | 5625.00000 | 6250.000 | 5000.000 | 0.8889 | 1.0000 | 6250.000 | 5000.000 | 1.7778 | 2.0000 | 6250.000 | 5000.000 | 8.8889 | 10.0000 |
| 5000 | 0.2 | 6666.66667 | 8333.333 | 5000.000 | 0.7500 | 1.0000 | 8333.333 | 5000.000 | 1.5000 | 2.0000 | 8333.333 | 5000.000 | 7.5000 | 10.0000 |
| 5000 | 0.3 | 8750.00000 | 12500.000 | 5000.000 | 0.5714 | 1.0000 | 12500.000 | 5000.000 | 1.1429 | 2.0000 | 12500.000 | 5000.000 | 5.7143 | 10.0000 |
| 5000 | 0.4 | 15000.00000 | 25000.000 | 5000.000 | 0.3333 | 1.0000 | 25000.000 | 5000.000 | 0.6667 | 2.0000 | 25000.000 | 5000.000 | 3.3333 | 10.0000 |
| 5000 | 0.5 | #DIV/0! | #DIV/0! | 5000.000 | 0.0000 | 1.0000 | #DIV/0! | 5000.000 | 0.0000 | 2.0000 | #DIV/0! | 5000.000 | 0.0000 | 10.0000 |
| 5000 | 0.6 | -10000.00000 | -25000.000 | 5000.000 | -0.5000 | 1.0000 | -25000.000 | 5000.000 | -1.0000 | 2.0000 | -25000.000 | 5000.000 | -5.0000 | 10.0000 |
| 5000 | 0.7 | -3750.00000 | -12500.000 | 5000.000 | -1.3333 | 1.0000 | -12500.000 | 5000.000 | -2.6667 | 2.0000 | -12500.000 | 5000.000 | -13.3333 | 10.0000 |
| 5000 | 0.8 | -1666.66667 | -8333.333 | 5000.000 | -3.0000 | 1.0000 | -8333.333 | 5000.000 | -6.0000 | 2.0000 | -8333.333 | 5000.000 | -30.0000 | 10.0000 |
| 5000 | 0.9 | -625.00000 | -6250.000 | 5000.000 | -8.0000 | 1.0000 | -6250.000 | 5000.000 | -16.0000 | 2.0000 | -6250.000 | 5000.000 | -80.0000 | 10.0000 |
| 5000 | 1 | 0.00000 | #DIV/0! | 5000.000 | #DIV/0! | 1.0000 | #DIV/0! | 5000.000 | #DIV/0! | 2.0000 | #DIV/0! | 5000.000 | #DIV/0! | 10.0000 |

| Vout | Duty Cycle | Vg | IA | vA | IB | vb | ic | vc | id | vd |
|---|---|---|---|---|---|---|---|---|---|---|
| 5000 | 0 | 5000.00000 | 0.000 | 5000.000 | 0.000 | -5000.000 | 1.000 | 5000.000 | 1.000 | -5000.000 |
| 5000 | 0.1 | 5625.00000 | -0.111 | 6250.000 | -0.111 | -6250.000 | 1.000 | 6250.000 | 1.000 | -6250.000 |
| 5000 | 0.2 | 6666.66667 | -0.250 | 8333.333 | -0.250 | -8333.333 | 1.000 | 8333.333 | 1.000 | -8333.333 |
| 5000 | 0.3 | 8750.00000 | -0.429 | 12500.000 | -0.429 | -12500.000 | 1.000 | 12500.000 | 1.000 | -12500.000 |
| 5000 | 0.4 | 15000.00000 | -0.667 | 25000.000 | -0.667 | -25000.000 | 1.000 | 25000.000 | 1.000 | -25000.000 |
| 5000 | 0.5 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| 5000 | 0.6 | -10000.00000 | -1.500 | -25000.000 | -1.500 | 25000.000 | 1.000 | -25000.000 | 1.000 | 25000.000 |
| 5000 | 0.7 | -3750.00000 | -2.333 | -12500.000 | -2.333 | 12500.000 | 1.000 | -12500.000 | 1.000 | 12500.000 |
| 5000 | 0.8 | -1666.66667 | -4.000 | -8333.333 | -4.000 | 8333.333 | 1.000 | -8333.333 | 1.000 | 8333.333 |
| 5000 | 0.9 | -625.00000 | -9.000 | -6250.000 | -9.000 | 6250.000 | 1.000 | -6250.000 | 1.000 | 6250.000 |
| 5000 | 1 | 0.00000 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |

| iA | vA | ib | vb | ic | vc | id | vd |
|---|---|---|---|---|---|---|---|
| 0.000 | 5000.000 | 0.000 | -5000.000 | 2.000 | 5000.000 | 2.000 | -5000.000 |
| -0.222 | 6250.000 | -0.222 | -6250.000 | 2.000 | 6250.000 | 2.000 | -6250.000 |
| -0.500 | 8333.333 | -0.500 | -8333.333 | 2.000 | 8333.333 | 2.000 | -8333.333 |
| -0.857 | 12500.000 | -0.857 | -12500.000 | 2.000 | 12500.000 | 2.000 | -12500.000 |
| -1.333 | 25000.000 | -1.333 | -25000.000 | 2.000 | 25000.000 | 2.000 | -25000.000 |
| #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| -3.000 | -25000.000 | -3.000 | 25000.000 | 2.000 | -25000.000 | 2.000 | 25000.000 |
| -4.667 | -12500.000 | -4.667 | 12500.000 | 2.000 | -12500.000 | 2.000 | 12500.000 |
| -8.000 | -8333.333 | -8.000 | 8333.333 | 2.000 | -8333.333 | 2.000 | 8333.333 |
| -18.000 | -6250.000 | -18.000 | 6250.000 | 2.000 | -6250.000 | 2.000 | 6250.000 |
| #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |

| IA | vA | ib | vb | ic | vc | id | vd |
|---|---|---|---|---|---|---|---|
| 0.000 | 5000.000 | 0.000 | -5000.000 | 10.000 | 5000.000 | 10.000 | -5000.000 |
| -1.111 | 6250.000 | -1.111 | -6250.000 | 10.000 | 6250.000 | 10.000 | -6250.000 |
| -2.500 | 8333.333 | -2.500 | -8333.333 | 10.000 | 8333.333 | 10.000 | -8333.333 |
| -4.286 | 12500.000 | -4.286 | -12500.000 | 10.000 | 12500.000 | 10.000 | -12500.000 |
| -6.667 | 25000.000 | -6.667 | -25000.000 | 10.000 | 25000.000 | 10.000 | -25000.000 |
| #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| -15.000 | -25000.000 | -15.000 | 25000.000 | 10.000 | -25000.000 | 10.000 | 25000.000 |
| -23.333 | -12500.000 | -23.333 | 12500.000 | 10.000 | -12500.000 | 10.000 | 12500.000 |
| -40.000 | -8333.333 | -40.000 | 8333.333 | 10.000 | -8333.333 | 10.000 | 8333.333 |
| -90.000 | -6250.000 | -90.000 | 6250.000 | 10.000 | -6250.000 | 10.000 | 6250.000 |
| #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |

The voltage standoff required for the switches and the caps is independant of the load resistance.

To cover the 25 kV present on C1 if we use a 0.4 or 0.6 duty cycle; we can stack 3 10kV Nova caps. See attached data sheet.

For the switches we can either use a couple of 12kV Thyristors or 6 HV IGBTs (9 stacked. This will depend on switch speed requirements

| | | | Rload High | 5000 | | | Rload Med | 2500 | | | Rload Low | 500 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vout | Duty Cycle | Vg | Vc1 | Vc2 | Il1 | Il2 | Vc1 | Vc2 | Il1 | Il2 | Vc1 | Vc2 | Il1 | Il2 |
| 500 | 0 | 500.00000 | 500.000 | 500.000 | 0.1000 | 0.1000 | 500.000 | 500.000 | 0.2000 | 0.2000 | 500.000 | 500.000 | 1.0000 | 1.0000 |
| 500 | 0.1 | 562.50000 | 625.000 | 500.000 | 0.0889 | 0.1000 | 625.000 | 500.000 | 0.1778 | 0.2000 | 625.000 | 500.000 | 0.8889 | 1.0000 |
| 500 | 0.2 | 666.66667 | 833.333 | 500.000 | 0.0750 | 0.1000 | 833.333 | 500.000 | 0.1500 | 0.2000 | 833.333 | 500.000 | 0.7500 | 1.0000 |
| 500 | 0.3 | 875.00000 | 1250.000 | 500.000 | 0.0571 | 0.1000 | 1250.000 | 500.000 | 0.1143 | 0.2000 | 1250.000 | 500.000 | 0.5714 | 1.0000 |
| 500 | 0.4 | 1500.00000 | 2500.000 | 500.000 | 0.0333 | 0.1000 | 2500.000 | 500.000 | 0.0667 | 0.2000 | 2500.000 | 500.000 | 0.3333 | 1.0000 |
| 500 | 0.5 | #DIV/0! | #DIV/0! | 500.000 | 0.0000 | 0.1000 | #DIV/0! | 500.000 | 0.0000 | 0.2000 | #DIV/0! | 500.000 | 0.0000 | 1.0000 |
| 500 | 0.6 | -1000.00000 | -2500.000 | 500.000 | -0.0500 | 0.1000 | -2500.000 | 500.000 | -0.1000 | 0.2000 | -2500.000 | 500.000 | -0.5000 | 1.0000 |
| 500 | 0.7 | -375.00000 | -1250.000 | 500.000 | -0.1333 | 0.1000 | -1250.000 | 500.000 | -0.2667 | 0.2000 | -1250.000 | 500.000 | -1.3333 | 1.0000 |
| 500 | 0.8 | -166.66667 | -833.333 | 500.000 | -0.3000 | 0.1000 | -833.333 | 500.000 | -0.6000 | 0.2000 | -833.333 | 500.000 | -3.0000 | 1.0000 |
| 500 | 0.9 | -62.50000 | -625.000 | 500.000 | -0.8000 | 0.1000 | -625.000 | 500.000 | -1.6000 | 0.2000 | -625.000 | 500.000 | -8.0000 | 1.0000 |
| 500 | 1 | 0.00000 | #DIV/0! | 500.000 | #DIV/0! | 0.1000 | #DIV/0! | 500.000 | #DIV/0! | 0.2000 | #DIV/0! | 500.000 | #DIV/0! | 1.0000 |

| Vout | Duty Cycle | Vg | iA | vA |
|---|---|---|---|---|
| 500 | 0 | 500.00000 | 0.000 | 500.000 |
| 500 | 0.1 | 562.50000 | -0.011 | 625.000 |
| 500 | 0.2 | 666.66667 | -0.025 | 833.333 |
| 500 | 0.3 | 875.00000 | -0.043 | 1250.000 |
| 500 | 0.4 | 1500.00000 | -0.067 | 2500.000 |
| 500 | 0.5 | #DIV/0! | #DIV/0! | #DIV/0! |
| 500 | 0.6 | -1000.00000 | -0.150 | -2500.000 |
| 500 | 0.7 | -375.00000 | -0.233 | -1250.000 |
| 500 | 0.8 | -166.66667 | -0.400 | -833.333 |
| 500 | 0.9 | -62.50000 | -0.900 | -625.000 |
| 500 | 1 | 0.00000 | #DIV/0! | #DIV/0! |

| iB | vb |
|---|---|
| 0.000 | -500.000 |
| -0.011 | -625.000 |
| -0.025 | -833.333 |
| -0.043 | -1250.000 |
| -0.067 | -2500.000 |
| #DIV/0! | #DIV/0! |
| -0.150 | 2500.000 |
| -0.233 | 1250.000 |
| -0.400 | 833.333 |
| -0.900 | 625.000 |
| #DIV/0! | #DIV/0! |

| ic | vc |
|---|---|
| 0.100 | 500.000 |
| 0.100 | 625.000 |
| 0.100 | 833.333 |
| 0.100 | 1250.000 |
| 0.100 | 2500.000 |
| #DIV/0! | #DIV/0! |
| 0.100 | -2500.000 |
| 0.100 | -1250.000 |
| 0.100 | -833.333 |
| 0.100 | -625.000 |
| #DIV/0! | #DIV/0! |

| id | vd |
|---|---|
| 0.100 | -500.000 |
| 0.100 | -625.000 |
| 0.100 | -833.333 |
| 0.100 | -1250.000 |
| 0.100 | -2500.000 |
| #DIV/0! | #DIV/0! |
| 0.100 | 2500.000 |
| 0.100 | 1250.000 |
| 0.100 | 833.333 |
| 0.100 | 625.000 |
| #DIV/0! | #DIV/0! |

| iA | vA |
|---|---|
| 0.000 | 500.000 |
| -0.022 | 625.000 |
| -0.050 | 833.333 |
| -0.086 | 1250.000 |
| -0.133 | 2500.000 |
| #DIV/0! | #DIV/0! |
| -0.300 | -2500.000 |
| -0.467 | -1250.000 |
| -0.800 | -833.333 |
| -1.800 | -625.000 |
| #DIV/0! | #DIV/0! |

| ib | vb |
|---|---|
| 0.000 | -500.000 |
| -0.022 | -625.000 |
| -0.050 | -833.333 |
| -0.086 | -1250.000 |
| -0.133 | -2500.000 |
| #DIV/0! | #DIV/0! |
| -0.300 | 2500.000 |
| -0.467 | 1250.000 |
| -0.800 | 833.333 |
| -1.800 | 625.000 |
| #DIV/0! | #DIV/0! |

| ic | vc |
|---|---|
| 0.200 | 500.000 |
| 0.200 | 625.000 |
| 0.200 | 833.333 |
| 0.200 | 1250.000 |
| 0.200 | 2500.000 |
| #DIV/0! | #DIV/0! |
| 0.200 | -2500.000 |
| 0.200 | -1250.000 |
| 0.200 | -833.333 |
| 0.200 | -625.000 |
| #DIV/0! | #DIV/0! |

| id | vd |
|---|---|
| 0.200 | -500.000 |
| 0.200 | -625.000 |
| 0.200 | -833.333 |
| 0.200 | -1250.000 |
| 0.200 | -2500.000 |
| #DIV/0! | #DIV/0! |
| 0.200 | 2500.000 |
| 0.200 | 1250.000 |
| 0.200 | 833.333 |
| 0.200 | 625.000 |
| #DIV/0! | #DIV/0! |

| iA | vA |
|---|---|
| 0.000 | 500.000 |
| -0.111 | 625.000 |
| -0.250 | 833.333 |
| -0.429 | 1250.000 |
| -0.667 | 2500.000 |
| #DIV/0! | #DIV/0! |
| -1.500 | -2500.000 |
| -2.333 | -1250.000 |
| -4.000 | -833.333 |
| -9.000 | -625.000 |
| #DIV/0! | #DIV/0! |

| ib | vb |
|---|---|
| 0.000 | -500.000 |
| -0.111 | -625.000 |
| -0.250 | -833.333 |
| -0.429 | -1250.000 |
| -0.667 | -2500.000 |
| #DIV/0! | #DIV/0! |
| -1.500 | 2500.000 |
| -2.333 | 1250.000 |
| -4.000 | 833.333 |
| -9.000 | 625.000 |
| #DIV/0! | #DIV/0! |

| ic | vc |
|---|---|
| 1.000 | 500.000 |
| 1.000 | 625.000 |
| 1.000 | 833.333 |
| 1.000 | 1250.000 |
| 1.000 | 2500.000 |
| #DIV/0! | #DIV/0! |
| 1.000 | -2500.000 |
| 1.000 | -1250.000 |
| 1.000 | -833.333 |
| 1.000 | -625.000 |
| #DIV/0! | #DIV/0! |

| id | vd |
|---|---|
| 1.000 | -500.000 |
| 1.000 | -625.000 |
| 1.000 | -833.333 |
| 1.000 | -1250.000 |
| 1.000 | -2500.000 |
| #DIV/0! | #DIV/0! |
| 1.000 | 2500.000 |
| 1.000 | 1250.000 |
| 1.000 | 833.333 |
| 1.000 | 625.000 |
| #DIV/0! | #DIV/0! |

This circuit will be more resonable to work with. With only 2.5kV to worry about a 3kV cap will work and a single 1.5kV HV1GB will be sufficient. Again, the induct currents are low enough that any off the shelf part should do.

| | | | Rload High | 5000 | | | Rload Med | 2500 | | | Rload Low | 500 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vout | Duty Cycle | Vg | Vc1 | Vc2 | Il1 | Il2 | Vc1 | Vc2 | Il1 | Il2 | Vc1 | Vc2 | Il1 | Il2 |
| 50 | 0 | 50.00000 | 50.000 | 50.000 | 0.0100 | 0.0100 | 50.000 | 50.000 | 0.0200 | 0.0200 | 50.000 | 50.000 | 0.1000 | 0.1000 |
| 50 | 0.1 | 56.25000 | 62.500 | 50.000 | 0.0089 | 0.0100 | 62.500 | 50.000 | 0.0178 | 0.0200 | 62.500 | 50.000 | 0.0889 | 0.1000 |
| 50 | 0.2 | 66.66667 | 83.333 | 50.000 | 0.0075 | 0.0100 | 83.333 | 50.000 | 0.0150 | 0.0200 | 83.333 | 50.000 | 0.0750 | 0.1000 |
| 50 | 0.3 | 87.50000 | 125.000 | 50.000 | 0.0057 | 0.0100 | 125.000 | 50.000 | 0.0114 | 0.0200 | 125.000 | 50.000 | 0.0571 | 0.1000 |
| 50 | 0.4 | 150.00000 | 250.000 | 50.000 | 0.0033 | 0.0100 | 250.000 | 50.000 | 0.0067 | 0.0200 | 250.000 | 50.000 | 0.0333 | 0.1000 |
| 50 | 0.5 | #DIV/0! | #DIV/0! | 50.000 | 0.0000 | 0.0100 | #DIV/0! | 50.000 | 0.0000 | 0.0200 | #DIV/0! | 50.000 | 0.0000 | 0.1000 |
| 50 | 0.6 | -100.00000 | -250.000 | 50.000 | -0.0050 | 0.0100 | -250.000 | 50.000 | -0.0100 | 0.0200 | -250.000 | 50.000 | -0.0500 | 0.1000 |
| 50 | 0.7 | -37.50000 | -125.000 | 50.000 | -0.0133 | 0.0100 | -125.000 | 50.000 | -0.0267 | 0.0200 | -125.000 | 50.000 | -0.1333 | 0.1000 |
| 50 | 0.8 | -16.66667 | -83.333 | 50.000 | -0.0300 | 0.0100 | -83.333 | 50.000 | -0.0600 | 0.0200 | -83.333 | 50.000 | -0.3000 | 0.1000 |
| 50 | 0.9 | -6.25000 | -62.500 | 50.000 | -0.0800 | 0.0100 | -62.500 | 50.000 | -0.1600 | 0.0200 | -62.500 | 50.000 | -0.8000 | 0.1000 |
| 50 | 1 | 0.00000 | #DIV/0! | 50.000 | #DIV/0! | 0.0100 | #DIV/0! | 50.000 | #DIV/0! | 0.0200 | #DIV/0! | 50.000 | #DIV/0! | 0.1000 |

| Vout | Duty Cycle | Vg | iA | vA |
|---|---|---|---|---|
| 50 | 0 | 50.00000 | 0.000 | 50.000 |
| 50 | 0.1 | 56.25000 | -0.001 | 62.500 |
| 50 | 0.2 | 66.66667 | -0.003 | 83.333 |
| 50 | 0.3 | 87.50000 | -0.004 | 125.000 |
| 50 | 0.4 | 150.00000 | -0.007 | 250.000 |
| 50 | 0.5 | #DIV/0! | #DIV/0! | #DIV/0! |
| 50 | 0.6 | -100.00000 | -0.015 | -250.000 |
| 50 | 0.7 | -37.50000 | -0.023 | -125.000 |
| 50 | 0.8 | -16.66667 | -0.040 | -83.333 |
| 50 | 0.9 | -6.25000 | -0.090 | -62.500 |
| 50 | 1 | 0.00000 | #DIV/0! | #DIV/0! |

| iB | vb |
|---|---|
| 0.000 | -50.000 |
| -0.001 | -62.500 |
| -0.003 | -83.333 |
| -0.004 | -125.000 |
| -0.007 | -250.000 |
| #DIV/0! | #DIV/0! |
| -0.015 | 250.000 |
| -0.023 | 125.000 |
| -0.040 | 83.333 |
| -0.090 | 62.500 |
| #DIV/0! | #DIV/0! |

| ic | vc |
|---|---|
| 0.010 | 50.000 |
| 0.010 | 62.500 |
| 0.010 | 83.333 |
| 0.010 | 125.000 |
| 0.010 | 250.000 |
| #DIV/0! | #DIV/0! |
| 0.010 | -250.000 |
| 0.010 | -125.000 |
| 0.010 | -83.333 |
| 0.010 | -62.500 |
| #DIV/0! | #DIV/0! |

| id | vd |
|---|---|
| 0.010 | -50.000 |
| 0.010 | -62.500 |
| 0.010 | -83.333 |
| 0.010 | -125.000 |
| 0.010 | -250.000 |
| #DIV/0! | #DIV/0! |
| 0.010 | 250.000 |
| 0.010 | 125.000 |
| 0.010 | 83.333 |
| 0.010 | 62.500 |
| #DIV/0! | #DIV/0! |

| iA | vA |
|---|---|
| 0.000 | 50.000 |
| -0.002 | 62.500 |
| -0.005 | 83.333 |
| -0.009 | 125.000 |
| -0.013 | 250.000 |
| #DIV/0! | #DIV/0! |
| -0.030 | -250.000 |
| -0.047 | -125.000 |
| -0.080 | -83.333 |
| -0.180 | -62.500 |
| #DIV/0! | #DIV/0! |

| ib | vb |
|---|---|
| 0.000 | -50.000 |
| -0.002 | -62.500 |
| -0.005 | -83.333 |
| -0.009 | -125.000 |
| -0.013 | -250.000 |
| #DIV/0! | #DIV/0! |
| -0.030 | 250.000 |
| -0.047 | 125.000 |
| -0.080 | 83.333 |
| -0.180 | 62.500 |
| #DIV/0! | #DIV/0! |

| ic | vc |
|---|---|
| 0.020 | 50.000 |
| 0.020 | 62.500 |
| 0.020 | 83.333 |
| 0.020 | 125.000 |
| 0.020 | 250.000 |
| #DIV/0! | #DIV/0! |
| 0.020 | -250.000 |
| 0.020 | -125.000 |
| 0.020 | -83.333 |
| 0.020 | -62.500 |
| #DIV/0! | #DIV/0! |

| id | vd |
|---|---|
| 0.020 | -50.000 |
| 0.020 | -62.500 |
| 0.020 | -83.333 |
| 0.020 | -125.000 |
| 0.020 | -250.000 |
| #DIV/0! | #DIV/0! |
| 0.020 | 250.000 |
| 0.020 | 125.000 |
| 0.020 | 83.333 |
| 0.020 | 62.500 |
| #DIV/0! | #DIV/0! |

| iA | vA |
|---|---|
| 0.000 | 50.000 |
| -0.011 | 62.500 |
| -0.025 | 83.333 |
| -0.043 | 125.000 |
| -0.067 | 250.000 |
| #DIV/0! | #DIV/0! |
| -0.150 | -250.000 |
| -0.233 | -125.000 |
| -0.400 | -83.333 |
| -0.900 | -62.500 |
| #DIV/0! | #DIV/0! |

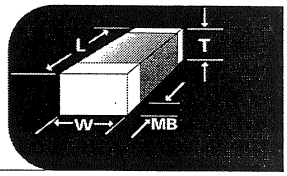
| ib | vb |
|---|---|
| 0.000 | -50.000 |
| -0.011 | -62.500 |
| -0.025 | -83.333 |
| -0.043 | -125.000 |
| -0.067 | -250.000 |
| #DIV/0! | #DIV/0! |
| -0.150 | 250.000 |
| -0.233 | 125.000 |
| -0.400 | 83.333 |
| -0.900 | 62.500 |
| #DIV/0! | #DIV/0! |

| ic | vc |
|---|---|
| 0.100 | 50.000 |
| 0.100 | 62.500 |
| 0.100 | 83.333 |
| 0.100 | 125.000 |
| 0.100 | 250.000 |
| #DIV/0! | #DIV/0! |
| 0.100 | -250.000 |
| 0.100 | -125.000 |
| 0.100 | -83.333 |
| 0.100 | -62.500 |
| #DIV/0! | #DIV/0! |

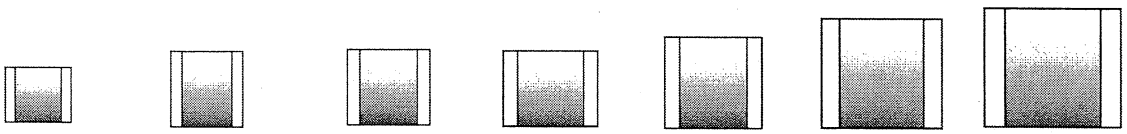
| id | vd |
|---|---|
| 0.100 | -50.000 |
| 0.100 | -62.500 |
| 0.100 | -83.333 |
| 0.100 | -125.000 |
| 0.100 | -250.000 |
| #DIV/0! | #DIV/0! |
| 0.100 | 250.000 |
| 0.100 | 125.000 |
| 0.100 | 83.333 |
| 0.100 | 62.500 |
| #DIV/0! | #DIV/0! |

With these low voltages, we can use a 500 V cap and a smaller DE1, DE-375 Power mosfet which has a low RDS but can still standoff 500V.

# HIGH VOLTAGE MLC - COMMERCIAL




## COMMERCIAL RANGES, RATED TO 10 KV



| SIZE | 3530 | 4040 | 4540 | 5440 | 5550 | 6560 | 7565 |
|---|---|---|---|---|---|---|---|
| Min Cap(C0G/X7R) | 390/102 | 390/102 | 390/102 | 390/102 | 390/102 | 560/202 | 101/202 |
| LENGTH L | .350 (8.89) | .400 (10.2) | .450 (11.4) | .540 (13.7) | .550 (11.4) | .650 (16.5) | .750 (19.0) |
| WIDTH W | .300 (7.62) | .400 (10.2) | .400 (10.2) | .400 (10.2) | .500 (12.7) | .600 (15.2) | .650 (16.5) |
| T MAX | .250 (6.35) | .300 (7.62) | .300 (7.62) | .300 (7.62) | .300 (7.62) | .300 (7.62) | .400 (10.2) |
| MB | .050 (1.27) | .060 (1.52) | .060 (1.52) | .060 (1.52) | .060 (1.52) | .060 (1.52) | .060 (1.52) |

### MAXIMUM CAPACITANCE

3 Digit Code: See How to Order

| VOLTAGE | C0G | X7R | C0G | X7R | C0G | X7R | C0G | X7R | C0G | X7R | C0G | X7R | C0G | X7R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 500V | 683 | 105 | 473 | 125 | 104 | 155 | 563 | 225 | 154 | 275 | 224 | 475 | 274 | 685 |
| 1000V | 223 | 474 | 393 | 824 | 473 | 105 | 563 | 105 | 823 | 155 | 124 | 225 | 154 | 275 |
| 2000V | 153 | 683 | 273 | 154 | 333 | 184 | 393 | 184 | 563 | 274 | 823 | 394 | 104 | 684 |
| 3000V | 123 | 333 | 223 | 683 | 273 | 823 | 273 | 104 | 393 | 154 | 683 | 224 | 823 | 394 |
| 4000V | 682 | 183 | 153 | 333 | 183 | 393 | 223 | 473 | 333 | 683 | 473 | 104 | 563 | 184 |
| 5000V | 272 | 103 | 472 | 183 | 562 | 223 | 682 | 273 | 103 | 393 | 123 | 563 | 223 | 104 |
| 6000V | 152 | 562 | 272 | 123 | 272 | 123 | 332 | 153 | 472 | 223 | 682 | 333 | 103 | 563 |
| 7000V | 122 | 392 | 182 | 822 | 222 | 103 | 272 | 123 | 392 | 153 | 562 | 223 | 822 | 393 |
| 8000V | 102 | 332 | 182 | 682 | 182 | 682 | 222 | 822 | 332 | 123 | 472 | 183 | 682 | 333 |
| 9000V | 821 | 272 | 152 | 562 | 182 | 562 | 222 | 682 | 332 | 103 | 332 | 153 | 562 | 273 |
| 10000V | 471 | 222 | 152 | 472 | 821 | 472 | 102 | 562 | 152 | 822 | 222 | 123 | 562 | 223 |

Dimensions are in inches, bracketed dimensions in millimeters. Tolerances are +/- 5% L & W, or .015" (0.38 mm), whichever is greater. MB dimensions are maximum.

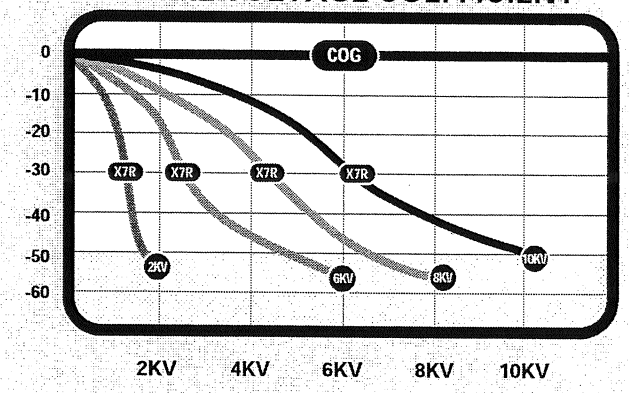
## COG DIELECTRIC CHARACTERISTICS

| | |
|---|---|
| OPERATING TEMPERATURE RANGE: | -55°C to 125°C |
| TEMPERATURE COEFFICIENT: | 0 +/- 30 ppm/°C |
| DISSIPATION FACTOR: | .001 (0.1%) max @ 25°C |
| INSULATION RESISTANCE, 25°C<br>125°C | >100GΩ or >1000ΩF<br>>10GΩ or >100 F |
| DIELECTRIC WITHSTANDING VOLTAGE:<br>*WHICHEVER IS GREATER | 120% VDCW, or 750V* |
| AGING RATE: | 0% per decade |
| TEST PARAMETERS: | 1KHz, 1.0 +/- 0.2 VRMS, 25°C<br>1MHZ for Capacitance <100pF |

## X7R DIELECTRIC CHARACTERISTICS

| | |
|---|---|
| OPERATING TEMPERATURE RANGE: | -55°C to 125°C |
| TEMPERATURE COEFFICIENT: | +/-15% ΔC Max. |
| DISSIPATION FACTOR @ 25° C: | .025 (2.5%) max @ 25°C |
| INSULATION RESISTANCE, 25°C<br>125°C | >100GΩ or >1000ΩF<br>>10GΩ or >100ΩF |
| DIELECTRIC WITHSTANDING VOLTAGE:<br>*WHICHEVER IS GREATER | 120% VDCW, or 750V* |
| AGING RATE: | < 2.0% per decade |
| TEST PARAMETERS: | 1KHz, 1.0 +/- 0.2 VRMS, 25°C |

%ΔC TYPICAL VOLTAGE COEFFICIENT




Dielectric withstanding voltage testing requires immersion of the device in a dielectric fluid to preclude arcing over the chip surface, notably at voltages exceeding 1000 VDC. Conformal coating of chips is recommended in use to eliminate arcing.

## HOW TO ORDER

| 4540 | B | 103 | M | 302 | N | X | T | M |
|---|---|---|---|---|---|---|---|---|
| **SIZE**<br>See Chart | **DIELECTRIC**<br>N = COG<br>B = X7R | **CAPACITANCE**<br>Value in Picofarads<br>Two significant figures, followed by number of zeros:<br>103 = 10,000 pF | **TOLERANCE**<br>J = +/- 5 %<br>K = +/- 10 %<br>M = +/- 20 %<br>Z = +80%-20%<br>P = +100%-0% | **VOLTAGE-VDCW**<br>Two significant figures, followed by number of zeros:<br>302=3000V | **TERMINATION**<br>N = Nickel Barrier (100% Sn) sizes 1515 to 4540 only<br>P = Palladium Silver<br>Y = Nickel Barrier (90Sn/10Pb) sizes 1515 to 4540 only | **THICKNESS OPTION**<br>X=Non-standard thickness. Specify in Mils if non-standard is required. Standard items are any thickness to Max shown in charts. | **PACKING OPTION**<br>T=Reeled | **MARKING OPTION**<br>M=Marked (See Marking Specifications) |