

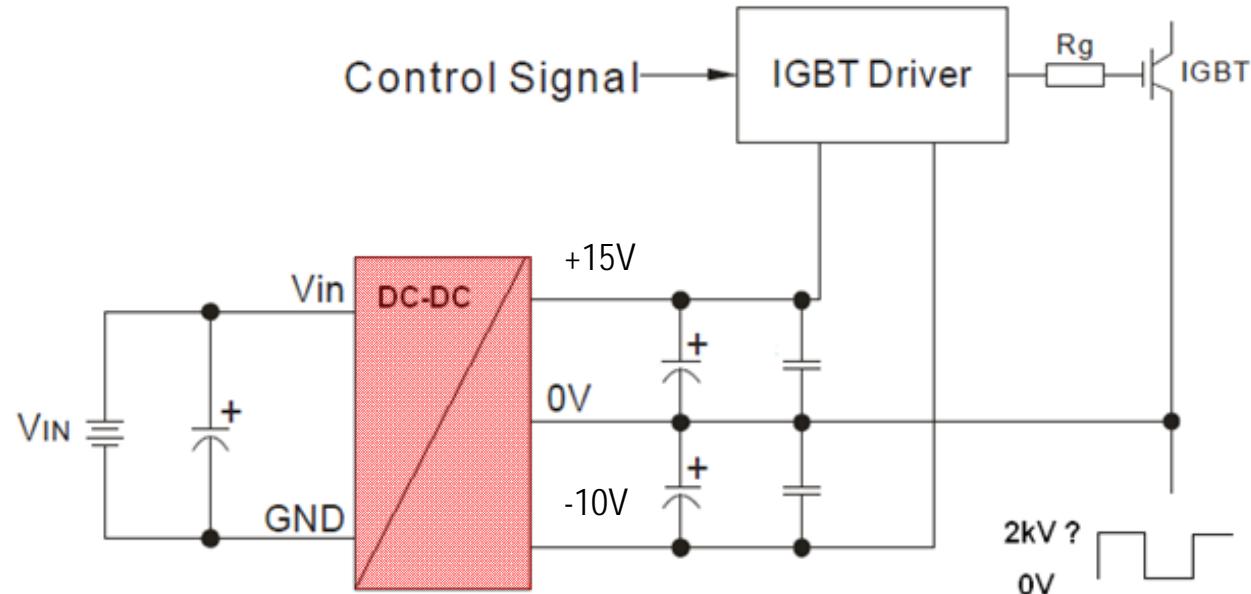


# MGJ3 and MGJ6 Power Supplies for IGBT, SIC and Mosfet Gate Drives

Presented by Frank Warnes

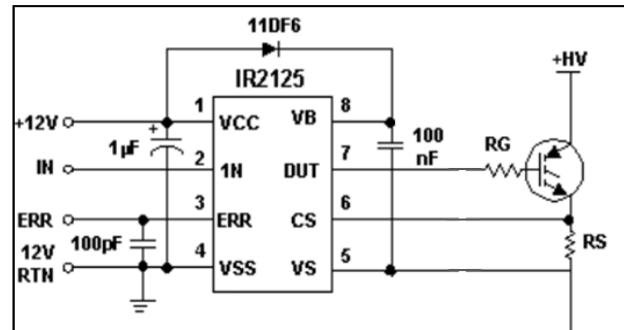
# PRINCIPLE OF GATE DRIVER POWER SUPPLY

## DC-DC Powering an IGBT Drive circuit

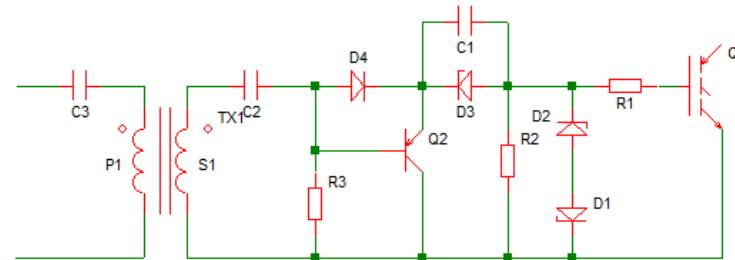


# ALTERNATIVES

## 1. Bootstrap - Low cost but unipolar and no isolation



## 2. Transformer Coupled – Relatively low cost but no desaturation protection



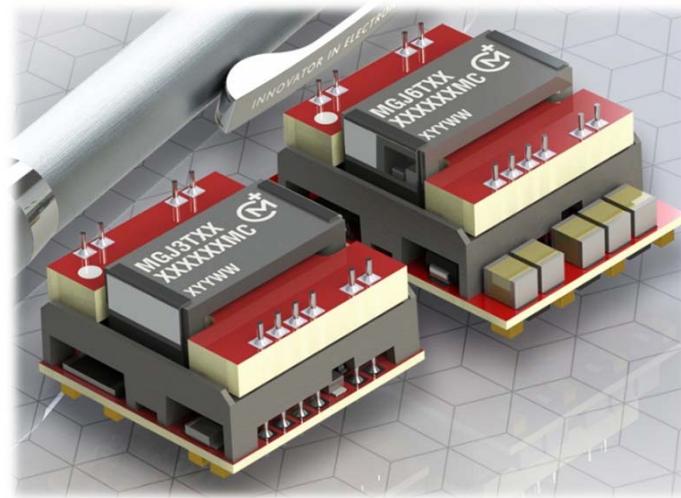
## 3. Standard Isolated Product – Not designed for high dV/dT

Short Description			Isolated Sub-Miniature 1W Dual Output DC/DC Converters	Isolated 2W Dual Output DC/DC Converters	Isolated 2W Dual Output SM DC/DC Converters	3kVDC Isolated 1W Dual Output SM DC/DC Converters	2W 3kVDC Dual Output Isolation DC/DC Converter, 12V input, +/-15V Output, high efficiency		+15V ±0.2A, Isolated 5W Wide Input Single & Dual Output DC/DC Converters, 9-36V Input
Data Sheet (pdf)	<a href="#">DATA SHEET (PDF)</a>	<a href="#">DATA SHEET (PDF)</a>	<a href="#">DATA SHEET (PDF)</a>	<a href="#">DATA SHEET (PDF)</a>	<a href="#">DATA SHEET (PDF)</a>	<a href="#">DATA SHEET (PDF)</a>	<a href="#">DATA SHEET (PDF)</a>	<a href="#">DATA SHEET (PDF)</a>	<a href="#">DATA SHEET (PDF)</a>
Dimensions (inch)	0.4 x 0.774 x 0.242	1.26 x 0.787 x 0.394	0.39 x 0.77 x 0.21	0.3 x 0.77 x 0.39	0.71 x 0.7 x 0.24	0.44 x 0.6 x 0.26	0.4 x 0.774 x 0.301	0.39 x 0.28 x 0.776	1.26 x 0.787 x 0.423
Dimensions (mm)	10.15 x 19.65 x 6.15	32 x 20 x 10	9.8 x 19.5 x 5.4	7.5 x 19.5 x 10	18 x 17.8 x 6	11.4 x 15.2 x 6.6	10.15 x 19.65 x 6.6	10 x 7 x 19.7	32.0 x 20.0 x 10.7
Efficiency (%)	88	87	82	84	84	82	87	88.5	87
Form Factor									
Output Current (A)	0.033	0.2	0.033	0.067	0.67	0.033	0.067	0.033	0.2
Output Current 2 (A)	-0.033	0.2	-0.033	-0.067	-0.67	-0.033	-0.067	-0.033	-0.2
Output Current 3 (A)									
Isolation (Vdc)	1000	1500	3000	1000	1000	3000	3000	3000	5200
Line Regulation Max (%)	1.1	0.7						1.1	0.5
Load Regulation Max (%)	3	1						3	0.2
Operating Temp. Range (C)	-40 to 85	-40 to 85			-40 to 85	-40 to 85	-40 to 85	-40 to 85	-40 to 85

# UNIQUE CONCEPT

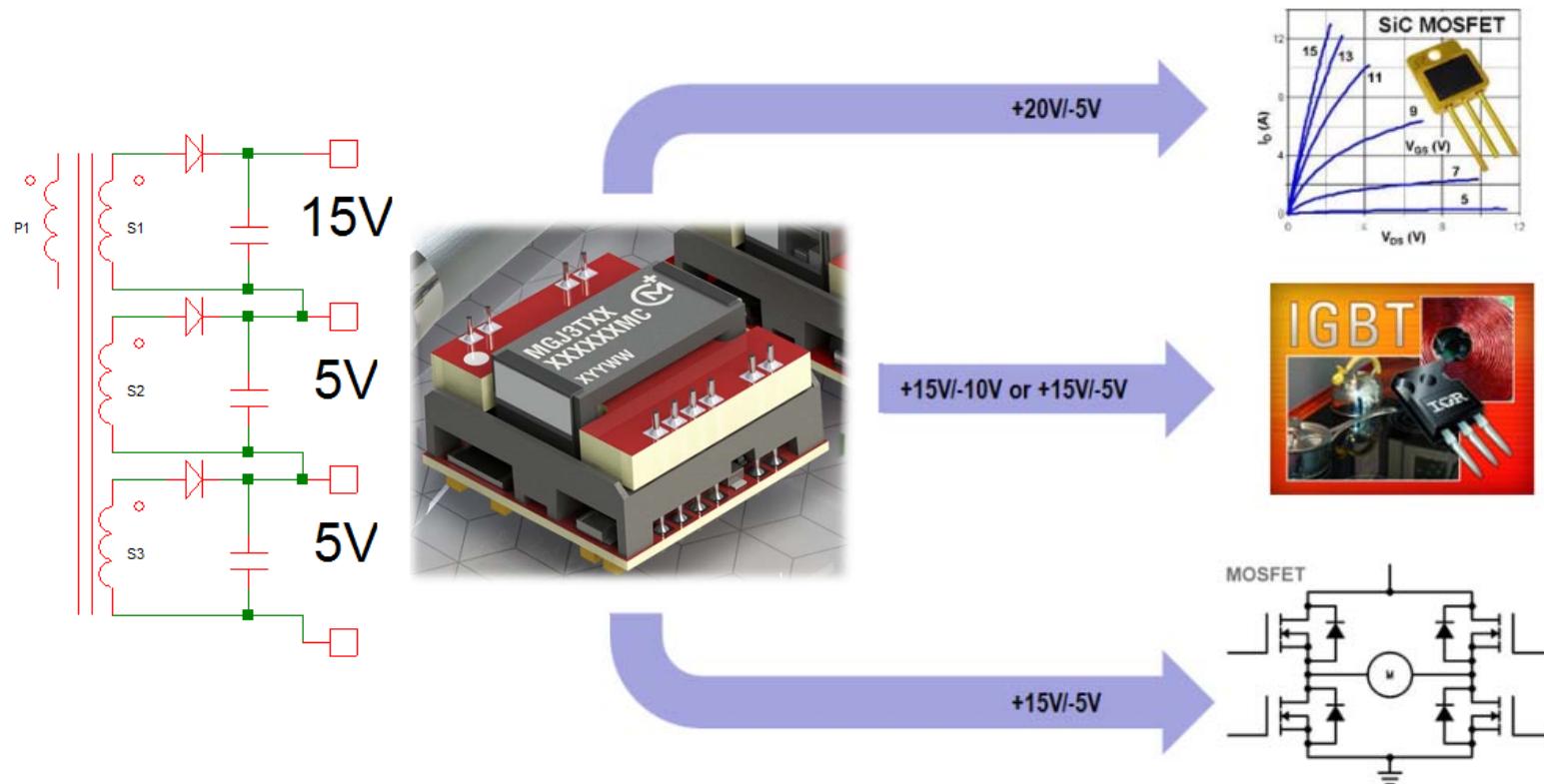
## Key Parameters

- Output Power: 3W (MGJ3)/6W (MGJ6)
- Temperature range: -40C to +105C
- Three input variants: 4.5v to 9V, 9V to 18V and 18V to 36V
- Surface Mount footprint open frame construction
- Isolation to UL60950 + 5.2kVDC 1 sec (7mm clearance)
- External On-Off/Synchronization control (Frequency dithering possible)
- Immune to High dV/dt (80kV/us) no opto feedback and low Capacitance
- Output configuration is suitable for IGBT, SiC and Mosfet
- Uses an automotive qualified pwm controller
- Overcurrent and Short circuit Protection (Hiccup)
- Planar Transformer for consistency, reliability and high isolation
- Four Patents applied for
- System tested by Nottingham University and characterised for partial discharge performance



# OUTPUT CONFIGURATIONS

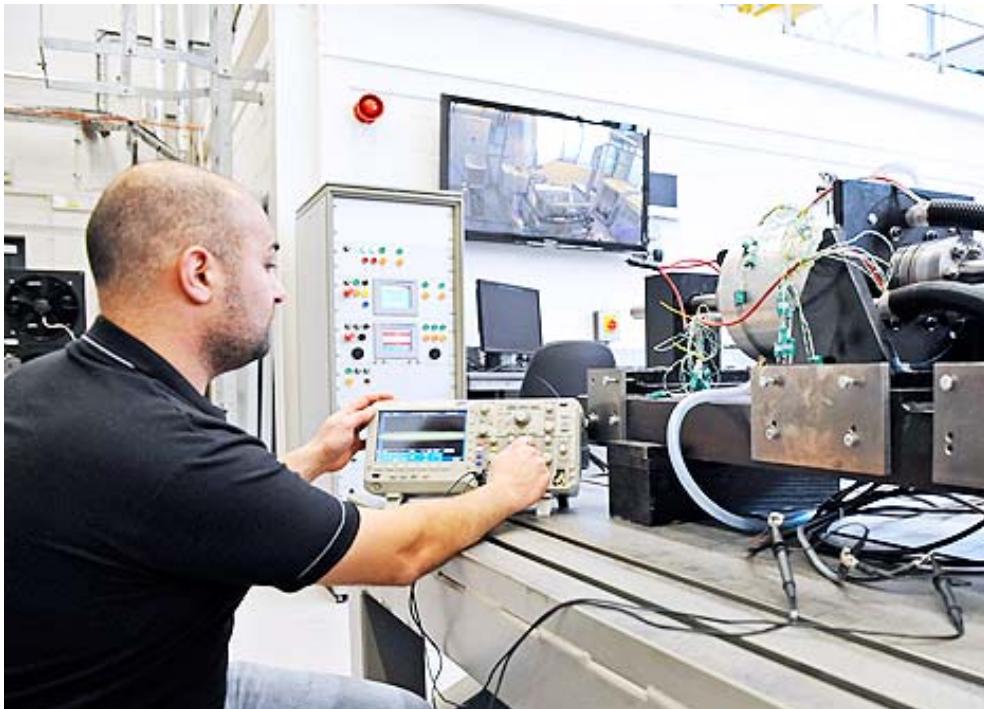
One output configuration for all three types of Power Switch



## TESTING IN TARGET SYSTEMS



Ranked 7th in the UK for Engineering and Technology. Has long been at the forefront of research and teaching in the area of Power Electronics and Drives.

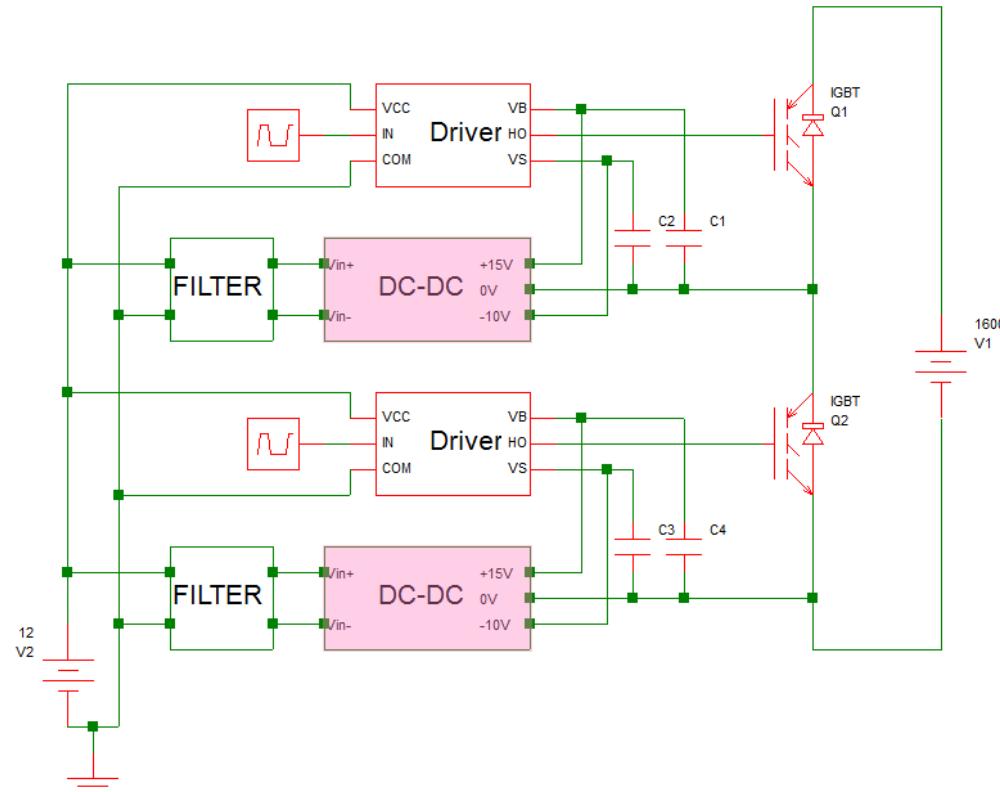


X-ray Tomography

High Power Test Facilities

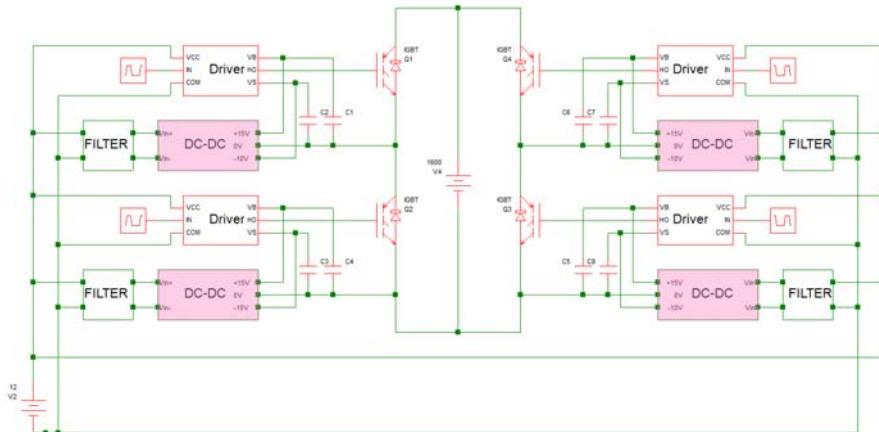
# DIFFERENT TOPOLOGIES

Half Bridge using 2 Units e.g. 2 x MGJ3 or 2 x MGJ6

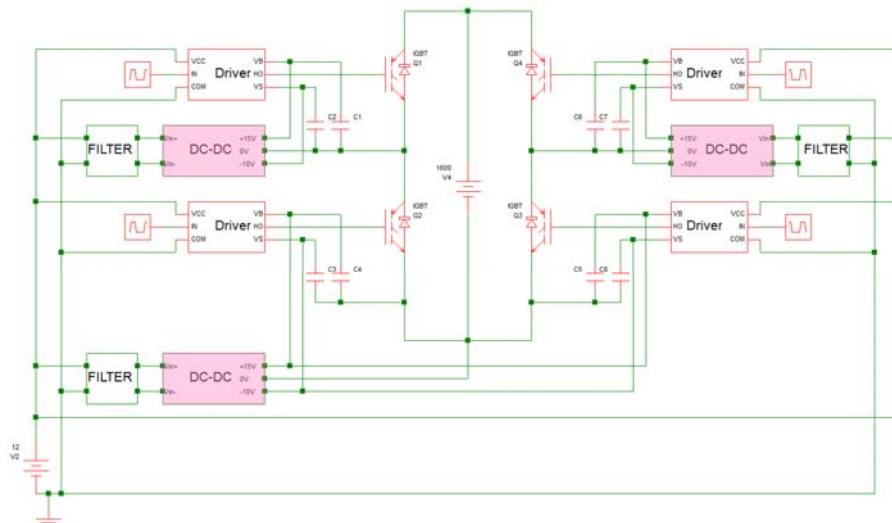


# DIFFERENT TOPOLOGIES

Full Bridge using 4 Units e.g. 4 x MGJ3 or 4 x MGJ6

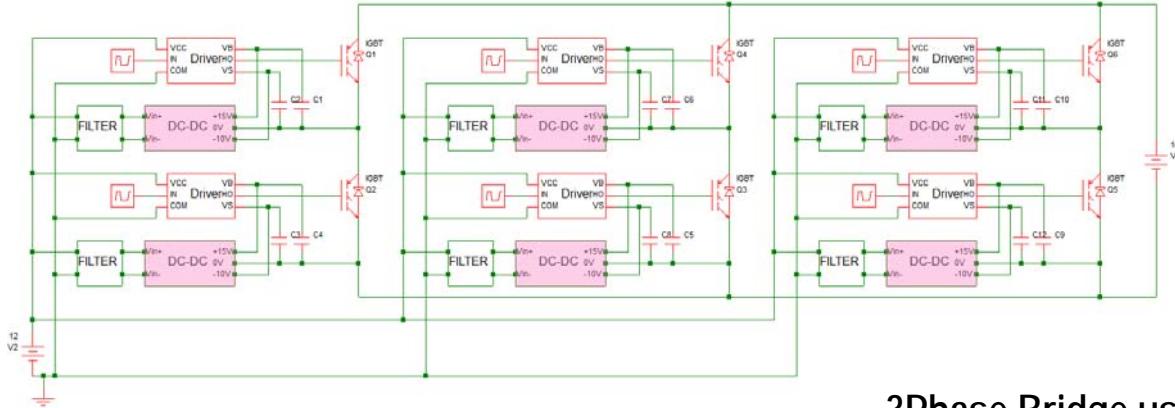


Full Bridge using 3 Units e.g. 2 x MGJ3 + 1 MGJ6

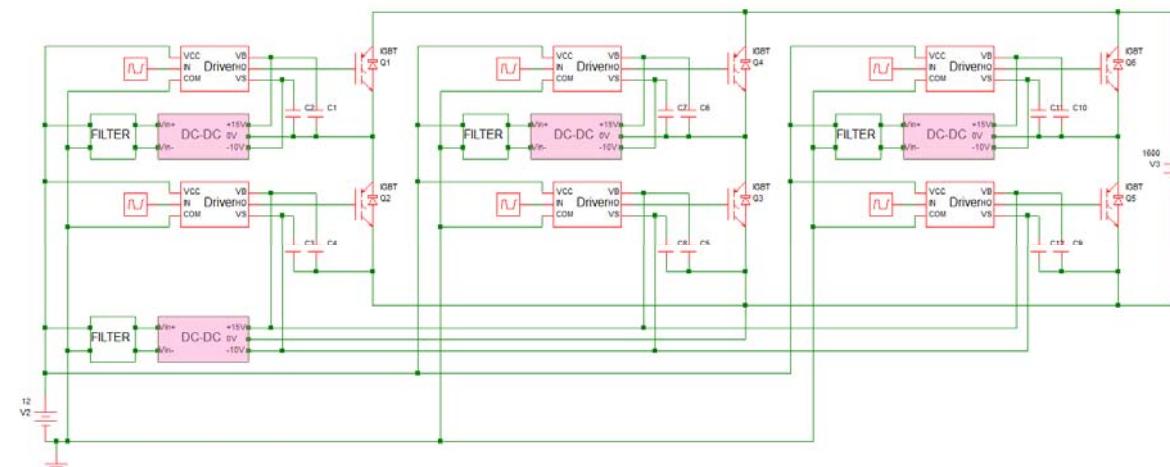


# DIFFERENT TOPOLOGIES

3Phase Bridge using 6 Units e.g. 6 x MGJ3 or 6 x MGJ6

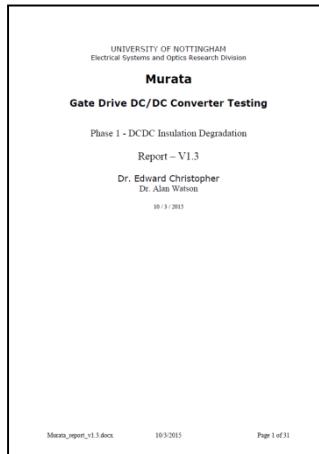


3Phase Bridge using 4 Units e.g. 3 x MGJ3 + 1 MGJ6



# AVAILABLE RESOURCES

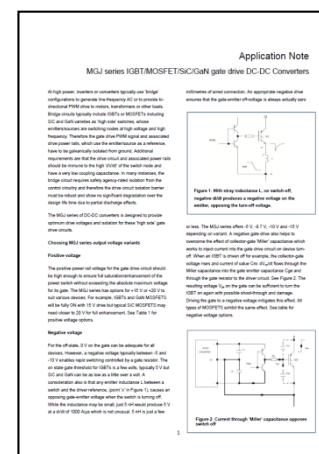
## Test Report from Nottingham University



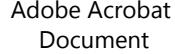
## IGBT DC-DC White Paper by Paul Lee



## MGJ series Application Note by Paul Lee



## IGBT DC-DC Selector Tool



Adobe Acrobat  
Document



Adobe Acrobat  
Document



Adobe Acrobat  
Document



Microsoft Excel  
Worksheet

[MGJ3 and MGJ6 Product Page - <http://www.murata-ps.com/en/news/new-products/2573>](http://www.murata-ps.com/en/news/new-products/2573)