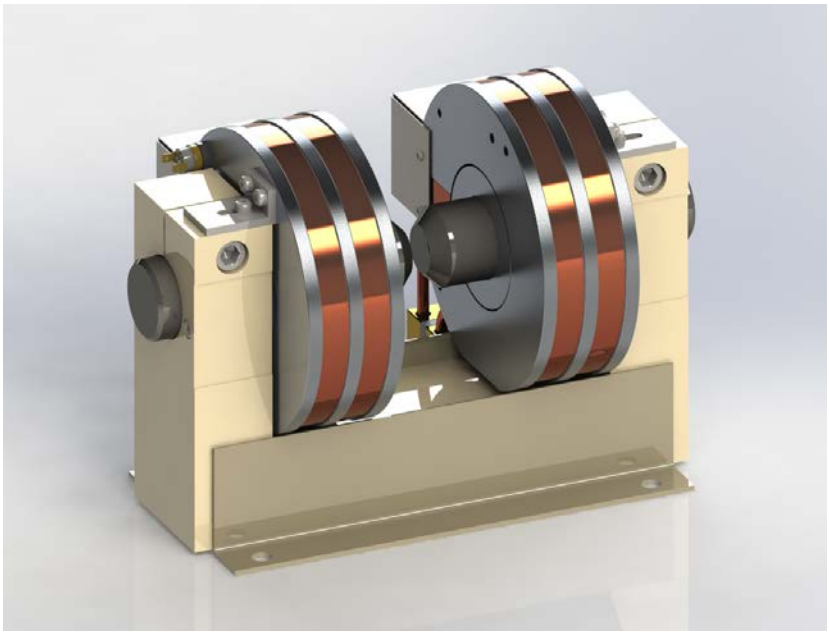
GMW

3480 Dipole Electromagnet

OVERVIEW



The 3480 dipole electromagnet is a light weight versatile system that can provide fields above 2 Tesla. At 32 kg this magnet can easily be moved between applications and can be operated in any orientation.

The system is intended to be compatible with systems that already utilize GMW's 3470 electromagnet.

The 3480 is shipped with a standard set of poles that optimize maximum field but several pole options are available. GMW can also design custom poles that achieve a specific performance. Poles are interchangeable and are available with an axial access bore.

FEATURES

- **Small and light weight at 32kg**
- **Peak fields up to 3.6 T for 5mm pole face diameter at 2mm gap**
- **Any mounting orientation**
- **Fast cycle times**

APPLICATIONS

- **EPR**
- **FMR**
- **MOKE**

Specification: 6 July 2016

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MODEL 3480 GENERAL SPECIFICATIONS

Dimensions	**285mm W x 197mm D x 213mm H (11.22 inch w x 7.76 inch D x 8.39 inch H)**
Weight (excluding hoses and water)	**32 kg (70 pounds)**
Standard Pole Face Diameter	**16.00mm (0.63 inch)**

Coils (series connected)

Resistance (20°C)	**1.375**	**Ω**
Max. Resistance (60°C)	**1.580**	**Ω**
Max. continuous current	**35**	**A**
Peak Current (sinusoid)	**50**	**A**
Peak Current (triangle wave)	**60**	**A**
Max. continuous Power	**2.0**	**kW**
Max Instantaneous Power	**8.0**	**kW**
Inductance	**180**	**mH**
Water Cooling (supply 18°C @ 15 psi)	**2**	**Litre/min**
Anticipated max. sinusoidal frequency (2T)	**10**	**Hz**
Over Temperature Interlock	**60**	**°C**

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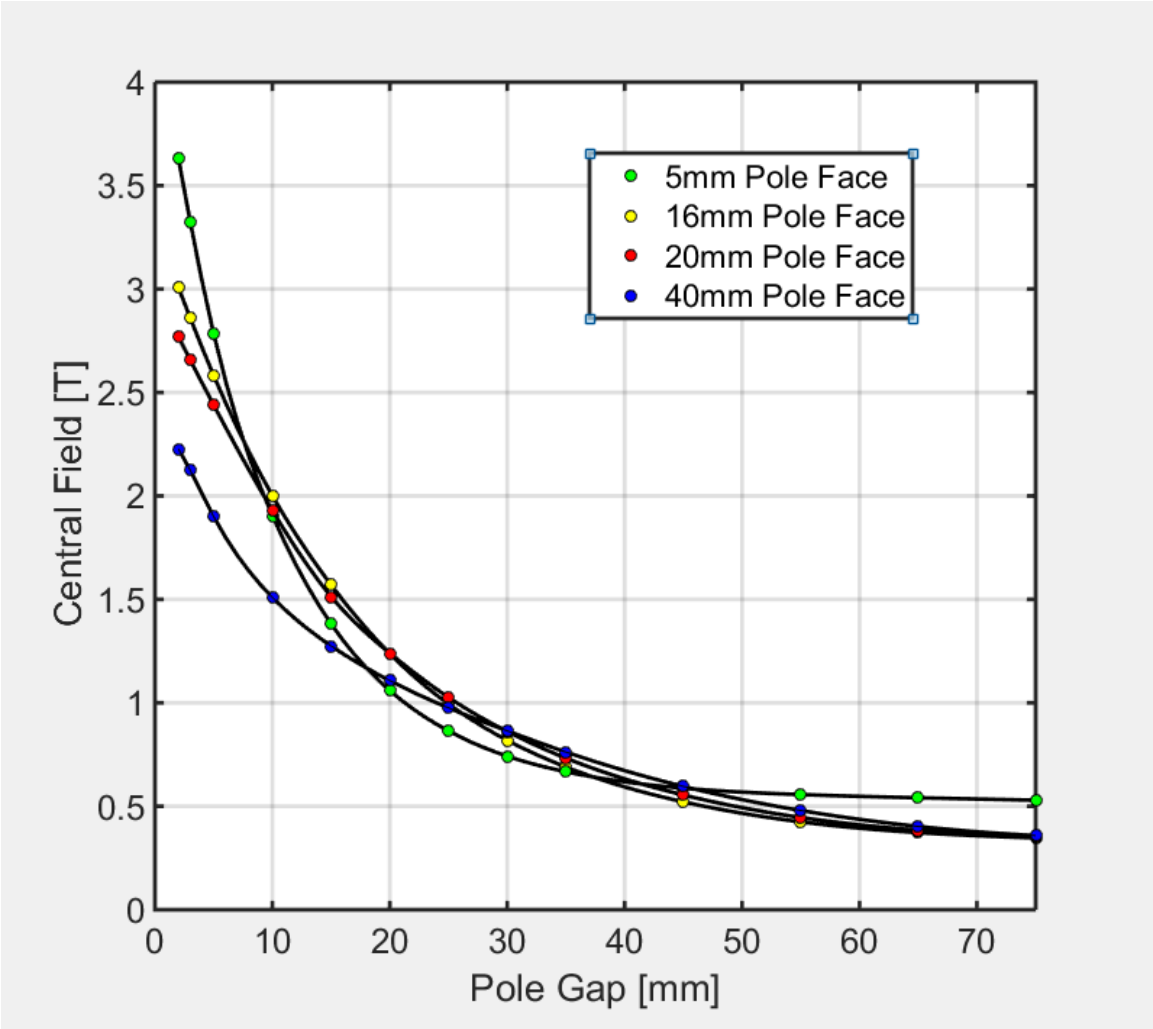

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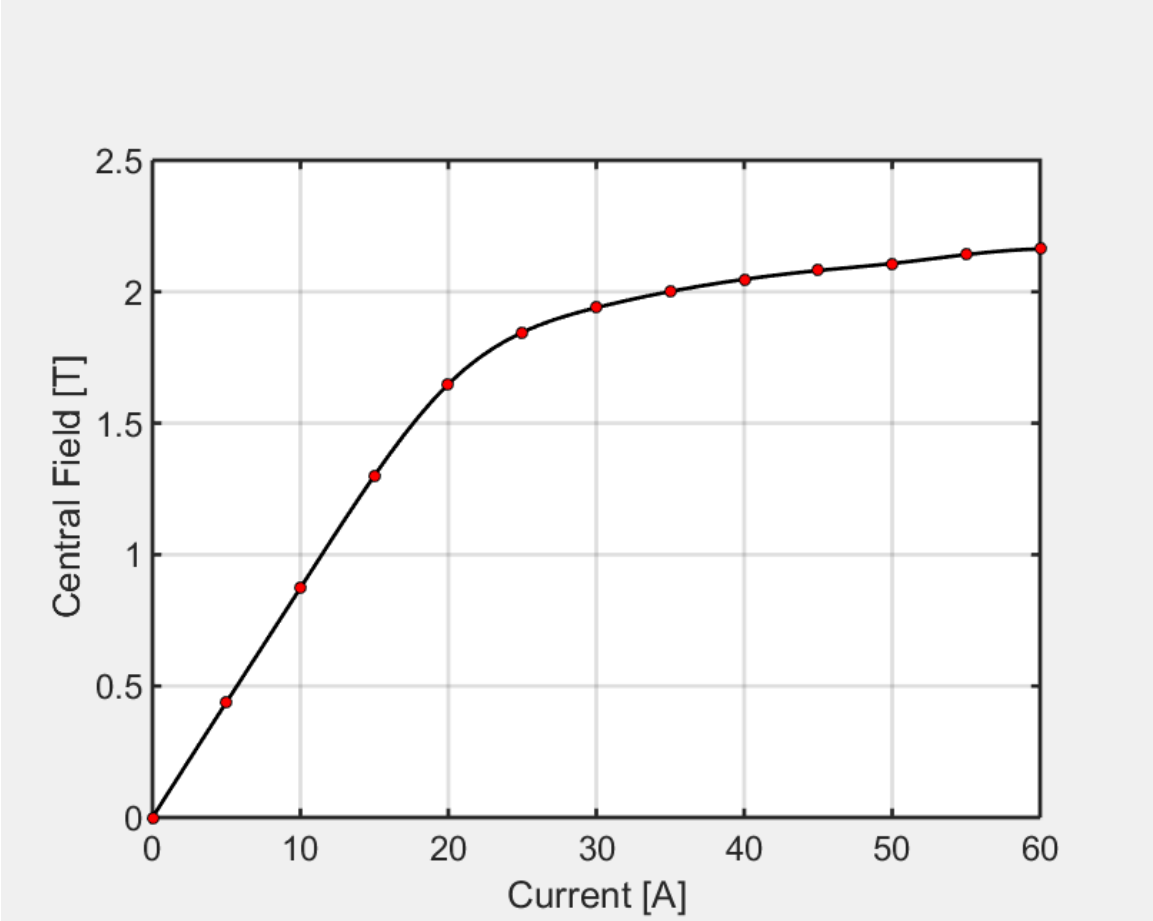

Figure 1: Excitation curve at 10mm pole gap for standard pole (pole face diameter 16mm) at continuous 35A operation with all windings connected in series. Peak achievable current is 60A in a triangle waveform and is limited by maximum cooling plate temperature of 60°C.

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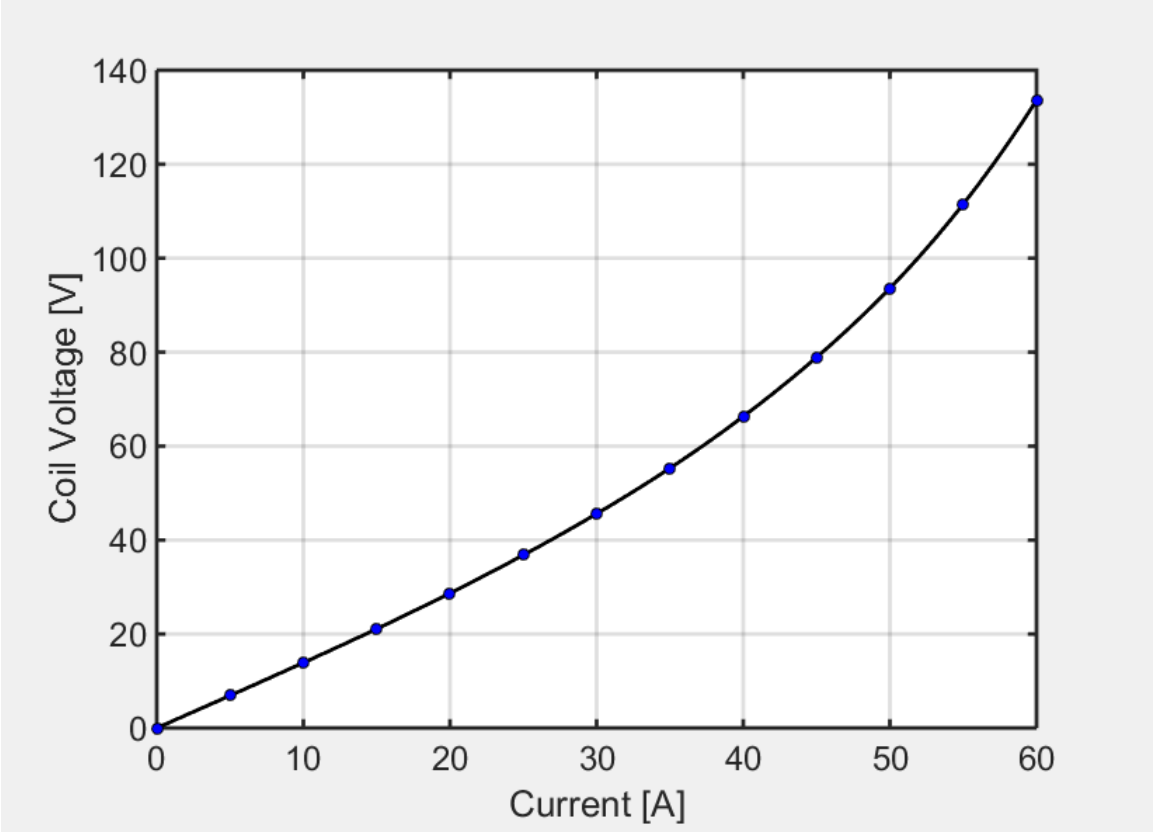

Figure 2: Current versus voltage curve for all windings connected in series. The departure from linearity is due to coil heating.

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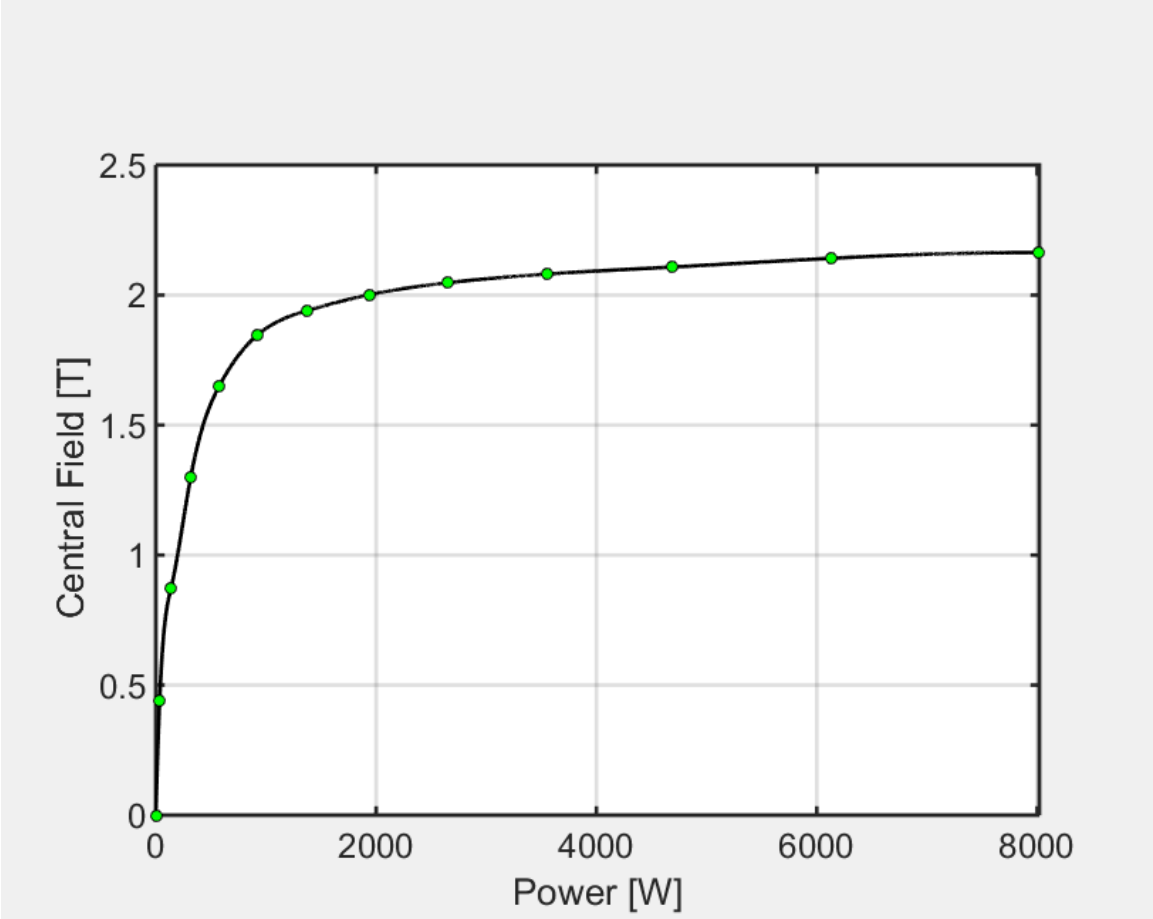

Figure 3: Peak achievable field against available power for standard pole (16mm pole face diameter) at 10mm pole gap. This plot assists the selection of power source for desired performance.

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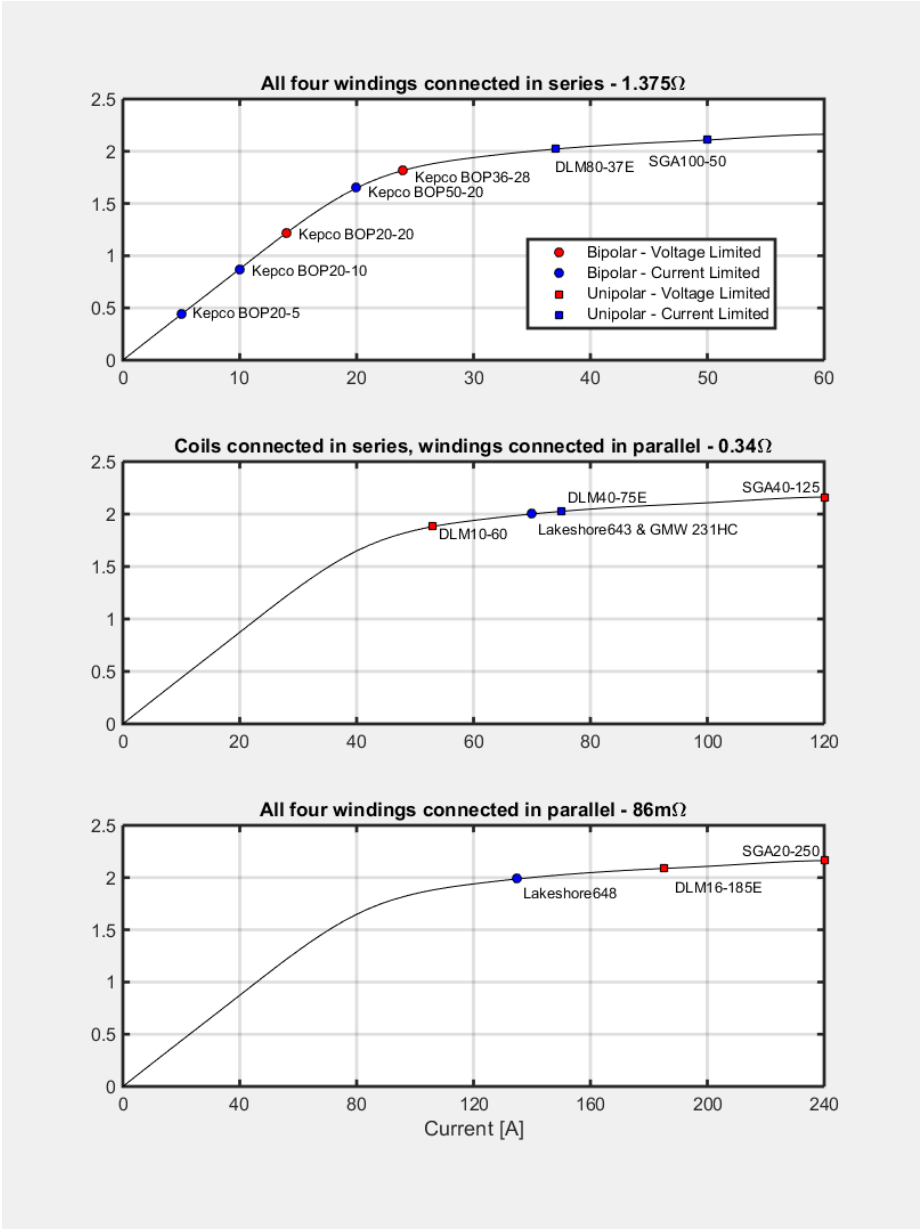

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Application Note: Ferromagnetic Resonance

A custom pole is designed to create peak field across a 2mm pole gap for the purposes of FMR analyses. A comparison with the standard 16mm pole is shown below.

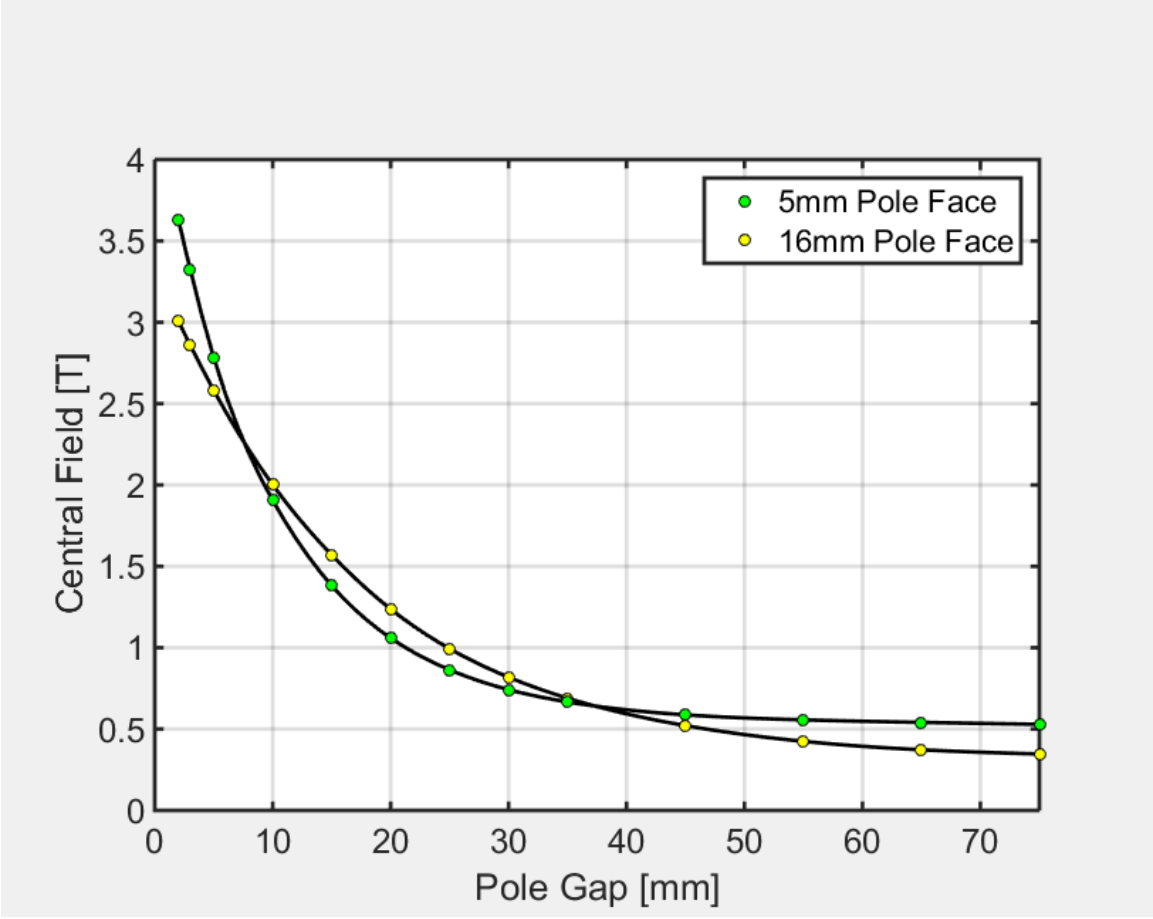

Figure 4: Field versus pole gap for two pole options. Excitation is 35A.

For any pole gap an optimised pole is available, on request, which will provide best performance for any specific pole gap.

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Field Uniformity in the Median Plane

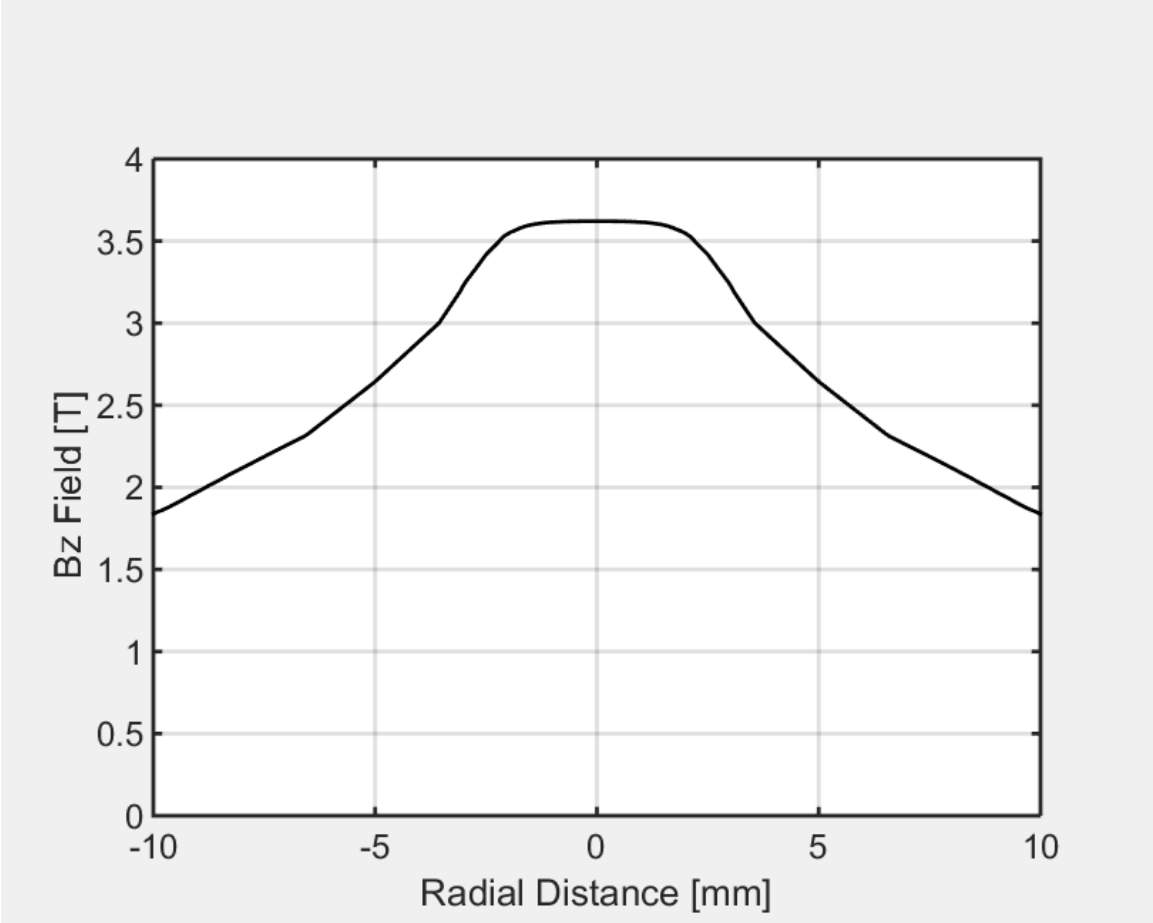

Figure 5: Field profile in the median plane for the 5mm pole face diameter pole. Excitation current is 35A. The field uniformity is better than ±0.5% over Ø3mm.

- **Peak continuous field 3.63 Tesla**
- **Peak pulsed field 3.77 Tesla**
- **Field uniformity <±0.5% over Ø3mm**
- **Higher uniformity field available on request.**

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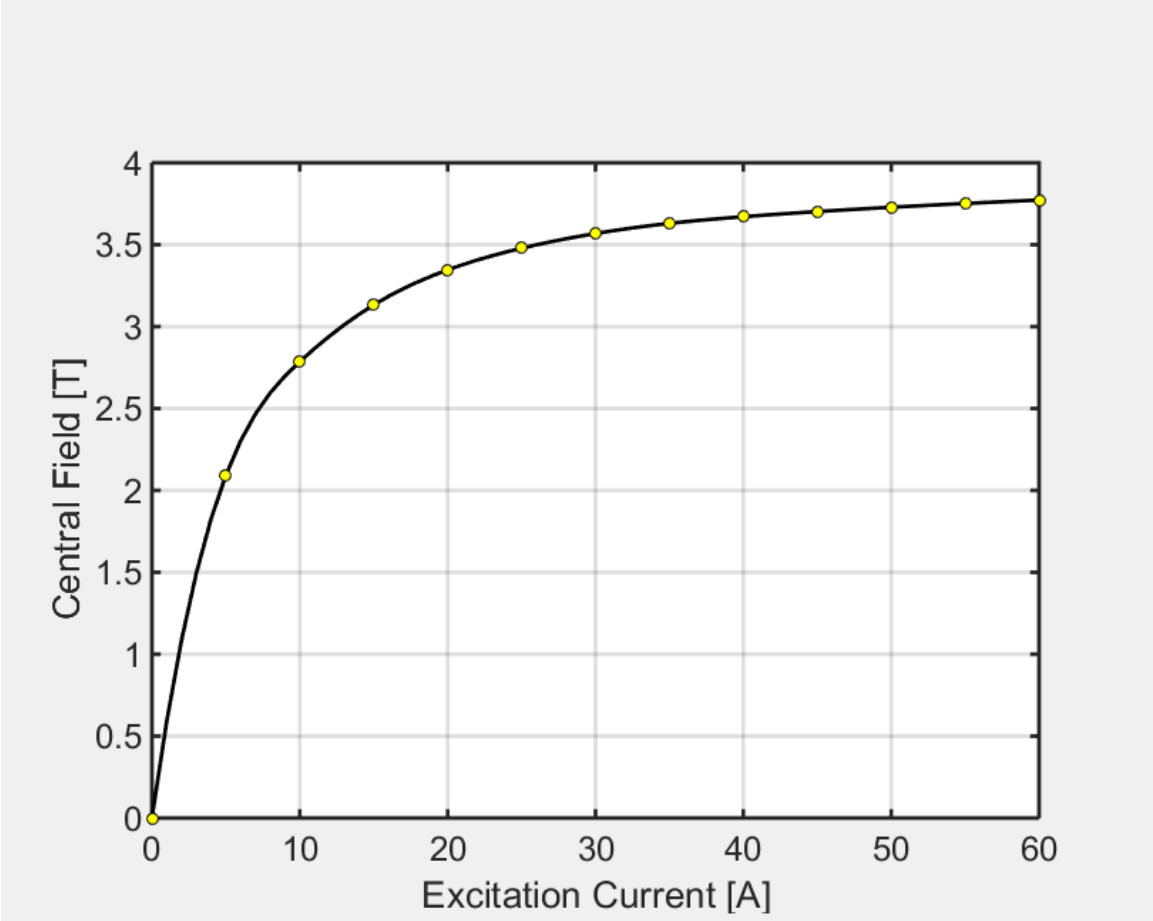

Figure 6: Performance of optimised pole for 2mm pole gap. Continuous operation is possible up to 35A with a triangle waveform possible up to 60A peak.

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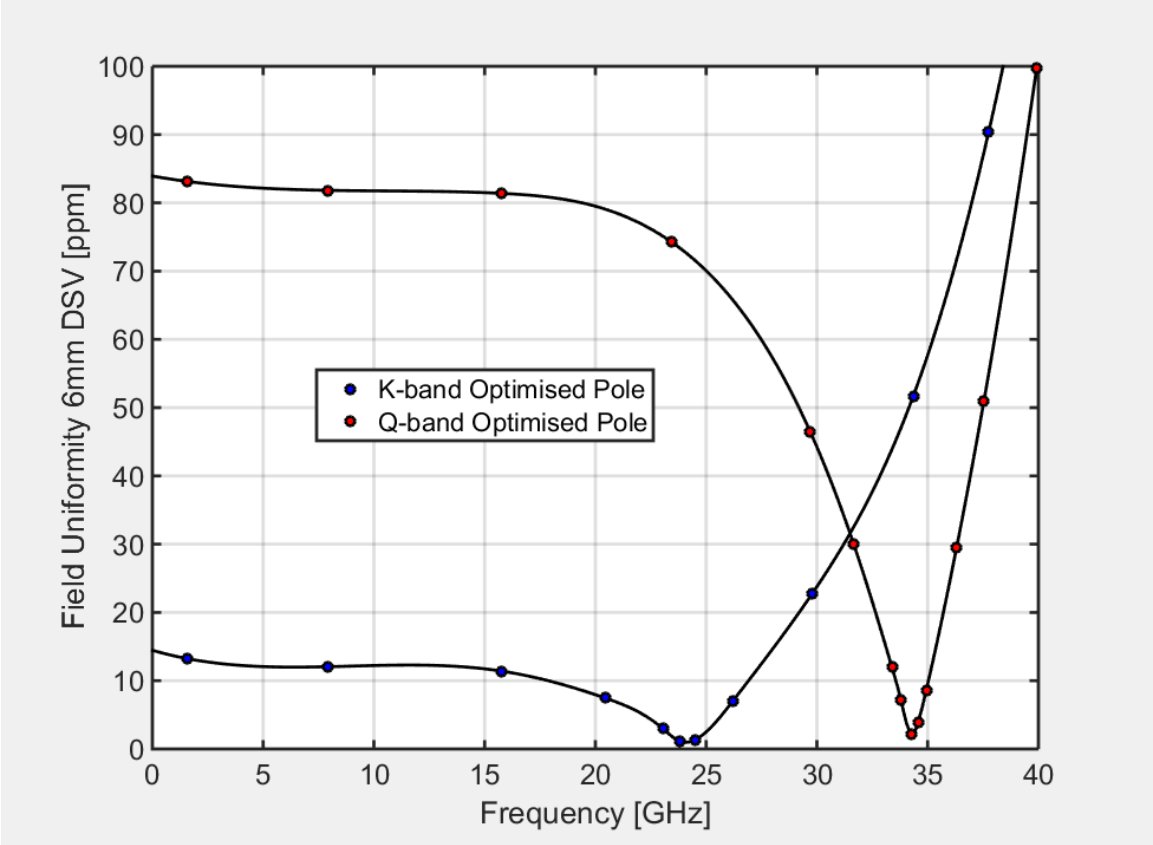
Application Note: EPR Spectroscopy

GMW offers poles optimised for EPR applications. Two examples are shown below for pole face spacing of 14mm. Each pole give good uniformity across the excitation range for frequencies up to 40GHz but each is optimised to give excellent field uniformity at either K-band or the Q-band. Similar custom poles are available on request for any frequency in the 0-40GHz frequency band.

Waveband	L	S	C	X	P	K	Q	U	V
λ [mm]	300	100	75	30	20	12.5	8.5	6	4.6
f [GHz]	0.8-1.2	3.4-3.8	4	9-10	15	24	34	50	65
B [T]	0.035	0.13	0.14	0.34	0.54	0.85	1.22	1.8	2.3



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