



Dynamic Engineers, Inc.

PRODUCTS BROCHURE
High Temperature

High Temperature Components

Design Solutions

Environmental Testing

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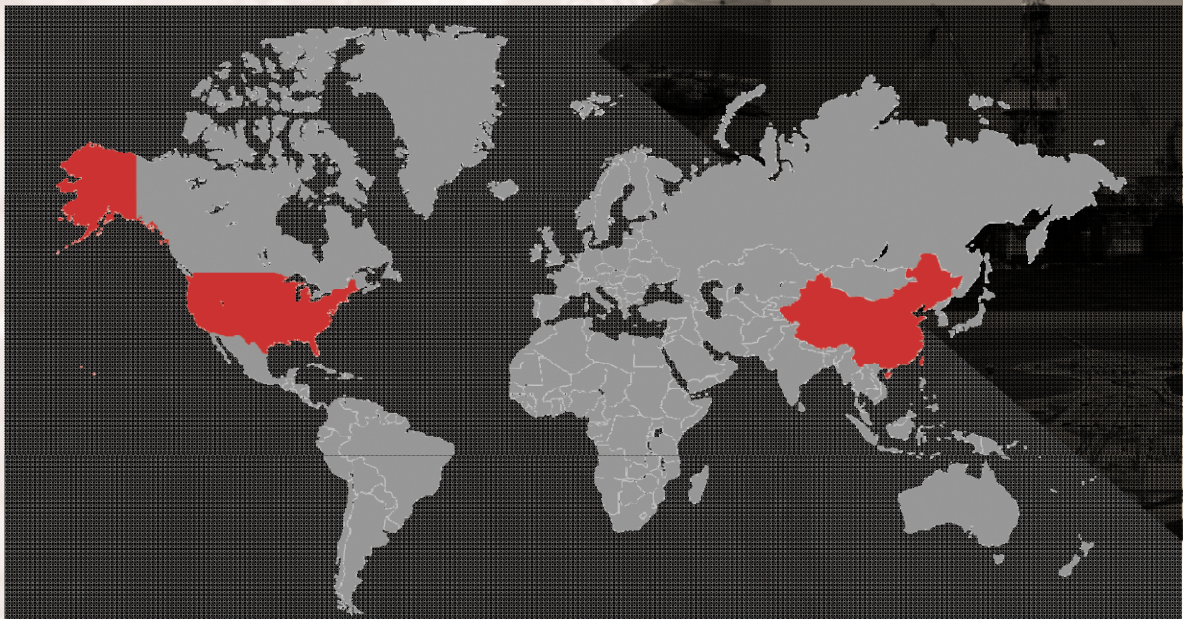
COMPANY INTRODUCTION

Company Introduction

Since 1986, Dynamic Engineers, Inc. (DEI) has been providing custom design solutions to global customers in extreme temperature industries including Automotive, Industrial and Oil & Gas. Some application examples are fuel cells in hybrid/electric cars, down-hole drilling tools and sensors on large scale excavating machines. Our headquarters is in Houston, Texas, in the heart of the oilfield technology capital.

DEI's long standing experience in the industry combined with our high standards for quality allow us to provide customized solutions for your high reliability needs. Many of our products are specially designed for extreme conditions and long term, consistent use.

Our global availability allows us to better bridge the gap between east and west by providing around the clock support and distribution capabilities. With our headquarters in the United States, an office in Hong Kong for international logistics and offices in seven cities in China to provide the sales and engineering support to customers worldwide.



Global Availability

Houston, Texas, USA (headquarters)

Phone: (+1) 281-870-8822

Hong Kong, China

Phone: (+852) 2368-7611

Chengdu, China

Phone: (+86) 28-8752-7135

Guangzhou, China

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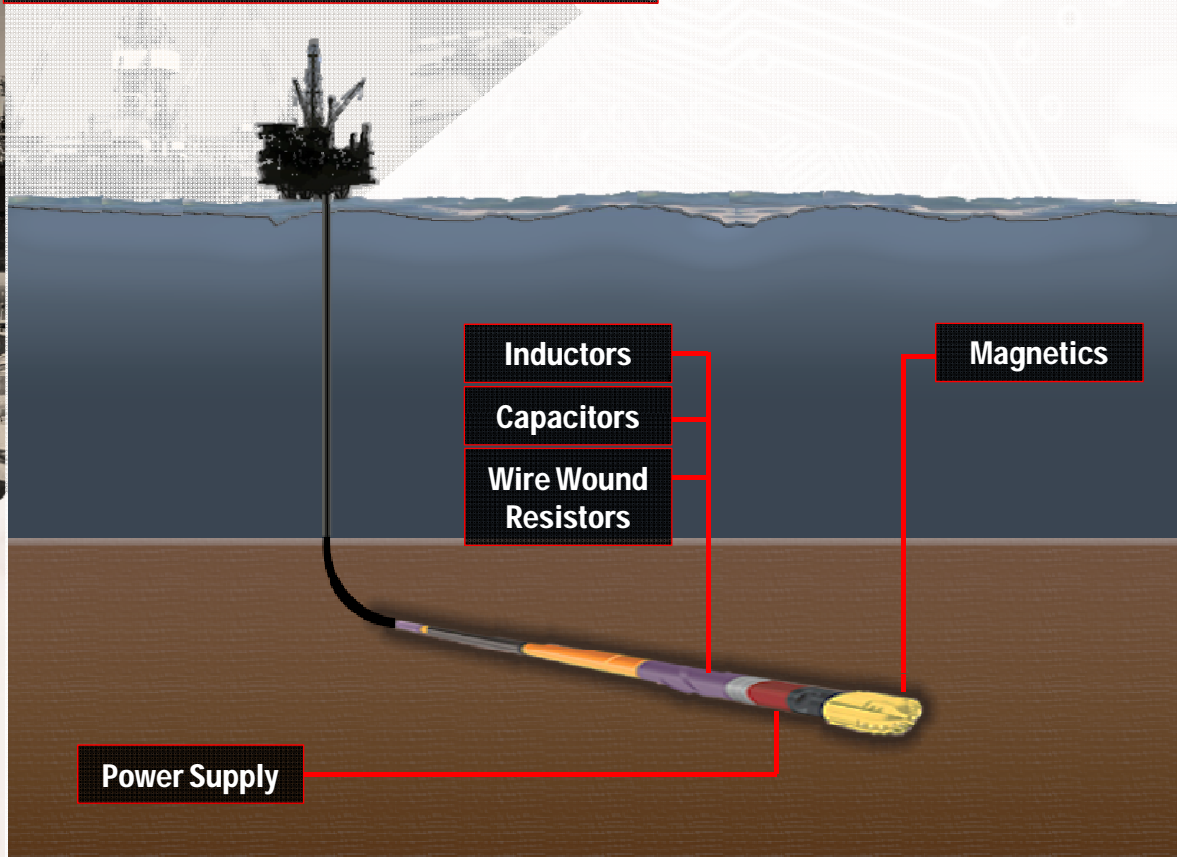
HIGH TEMPERATURE APPLICATIONS

High Temperature +300°C

Reliability is of extreme importance for Measurement While Drilling (MWD), Logging While Drilling (LWD), and Wire-line tools which operate in harsh environments. Therefore Dynamic Engineers offers components that have been exposed to temperatures, vibration, and shock well beyond actual operating requirements to ensure long life in the field. We strive to provide the best solutions for:

- High Temperature
- High Pressure
- Vibration / Shock
- Reliability
- Customer Builds

Downhole Components



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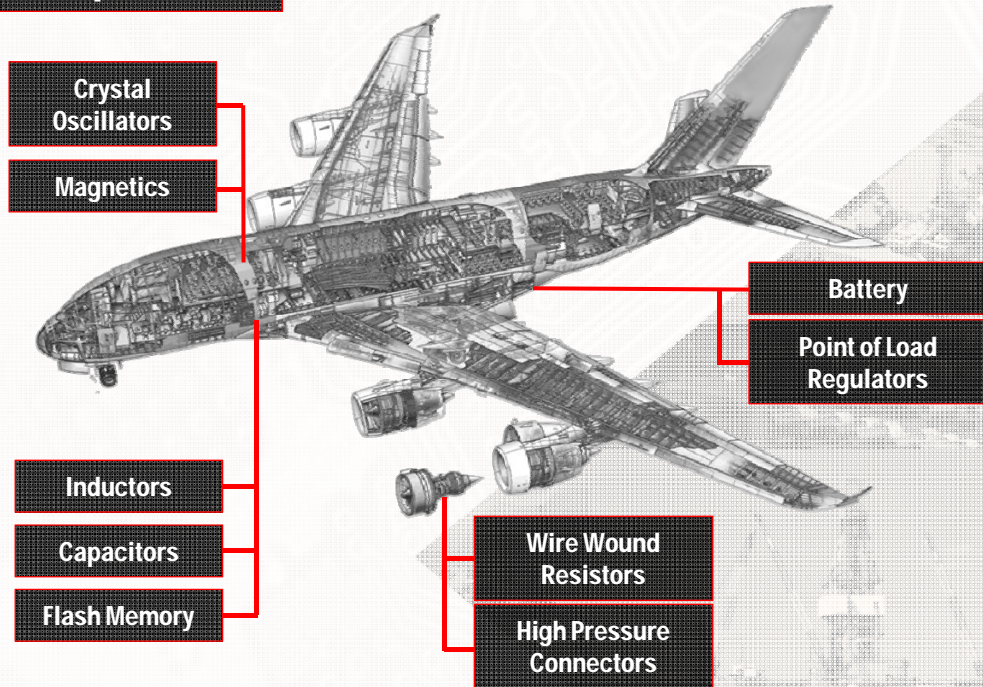
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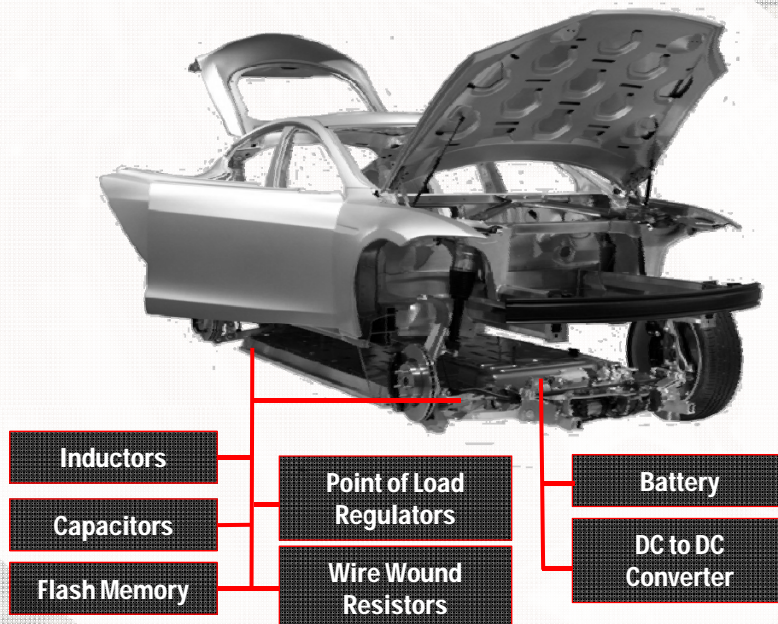
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HIGH TEMPERATURE APPLICATIONS

Airplane Components



Electric Car Components



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HIGH TEMPERATURE COMPONENTS

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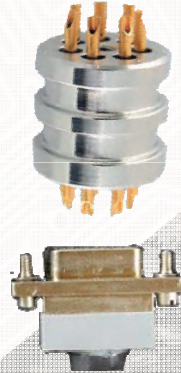
Dynamic Engineers, Inc.

HIGH TEMPERATURE COMPONENTS

High Pressure Connectors (+200°C at 25,000 psi)

Glass-To-Metal-Sealed (GTMS) bulkheads are designed to function under the severe combination of pressure and temperature commonly encountered in oil and gas exploration.

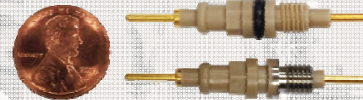
High reliability connectors used for various board level electronics within the downhole tool sensor, power distribution, and data collection electronics.



Single Feed-through Connectors (+250°C at 30,000 psi)

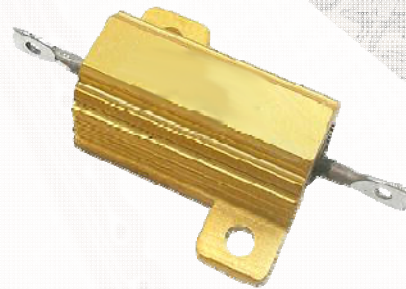
Rugged environment testing of these parts are done in high temperature brazing and glass-sealing furnaces, where pressures can reach 30,000 psi at 250°C. DEI offers packages in:

- Polyetheretherketone (PEEK) (20,000 psi at 150°C),
- Reinforced PEEK (25,000 psi at 200°C)
- Glass-to-Metal-Sealed (30,000 psi at 250°C)



Wire Wound Resistors (-55°C to +200°C)

- Temperature conditioned for improved stability
- Resistances from 0.02 to greater than 10 Ohms
- 100% maximum power up to 200°C
- Power Rating 0.1 to 10 Watts
- Resistance tolerances to ±0.5%
- Low TCR: ±25ppm/K standard
- Excellent pulse handling
- Non-inductive windings available
- Sizes ranging from 1.25 x 2.0 mm to 9.5 x 45.2 mm
- Packages available:
 - Leaded (R1000HT)
 - SMD (R3300HT)



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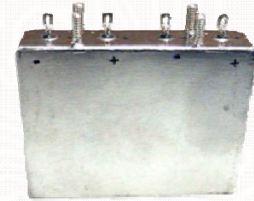


Dynamic Engineers, Inc.

HIGH TEMPERATURE COMPONENTS

Capacitor Bank Modules

Capacitor bank modules allow R&D engineers to handle very large capacitance and/or voltage requirements not easily obtained in standard individual capacitor models. Typically, internal sections of the cap bank take advantage of the special properties of wet tantalum capacitor (DEI part number: TanHT) technology arranged in series or in parallel circuit configurations.

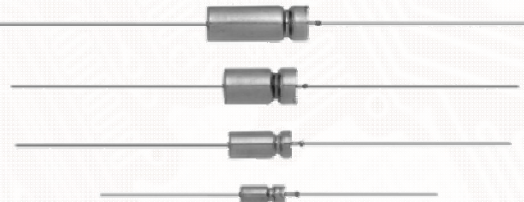


There are special applications where a mix of capacitor technologies are utilized to achieve smaller package dimensions and/or lower effective series resistance for pulse power (quick charging) requirements. Capacitor types such as ceramic, solid tantalum, and aluminum electrolytic are the most common used in combination with wet tantalum.

Dynamic Engineers also has specialized housing design knowledge for these capacitor banks in the areas of vibration isolation, and proper heat transfer. It is this substantial engineering experience in both selecting the right capacitor technology and package design that gives our company a competitive advantage in the market place.

Capacitors: TanHT (-55°C to +200°C)

- 10 uF To 1000 uF Capacitance Range
- Up To 200°C Maximum With Voltage Derating
- Capacitance Tolerance: $\pm 10\%$ Or $\pm 20\%$
- Life Test Min. 500 Hours At 200°C
- Rohs (100% Tin) Available
- Hermetically Sealed Package
- Four Case Size Ordering Options



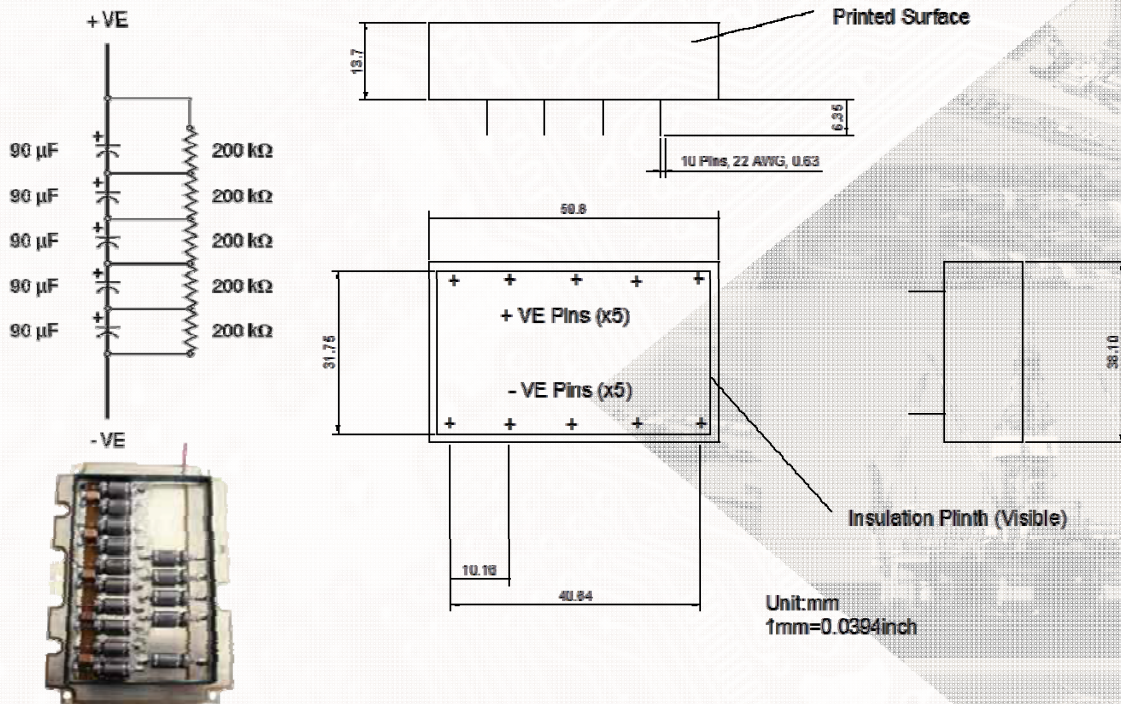
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Capacitor Bank: Case Study

Dynamic Engineers' capacitor bank modules have been used in downhole tool and industrial equipment over many years.



Parameter	Specification
Temperature Range	-55 to +200°C
Capacitance at 120Hz, 25°C	18uF±20%
Voltage at 85°C	625Vdc
Voltage at 200°C	300Vdc
%Dissipation factor at 120Hz, 25°C	50% Max.
Decay Time (from 625V to 3.5V)	<2 Min.
Reverse Voltage Capability	None
Surge Voltage Capability	1.15 Times Rated Voltage at Temperature
Max. RMS Ripple at 40KHz and 85°C	1.5A
Max. Weight	<100g
Resistors	Compatible for Application Power and Temperature
Capacitor Section	5 Pieces TanHT's

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HIGH TEMPERATURE COMPONENTS

Variable High Voltage Power Supplies (+200°C)

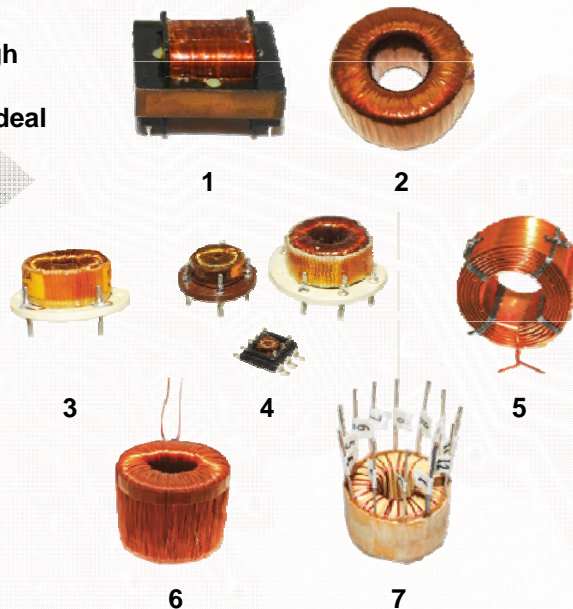
- Up to 200°C Operating Temperature
- Output Range: 500 to 2500 VDC
- Voltage or Resistor Controlled
- Compact Design
- Shielded and Encapsulated
- Bipolar or Single Ended Input



Magnetics (+250°C)

Our transformers can be designed for high vibration resistance and unit operating temperatures up to 250°C, making them ideal for industrial or down-hole applications.

1. PC-Mount Flyback Transformer
2. Toroid Mount Inductor
3. Power Toroidal Transformer
4. Toroid Mount / SMD Transformer
5. Sensor Coil
6. Power Toroidal Inductor
7. Multi-Output Signal Transformer



Additional Features and Capabilities:

- Power to 250 KVA
- Current to 1500 Amperes
- High voltage to 10 KV
- In-house steel cutting equipment which allows custom core configurations
- Long term quality and reliability experience

Inductors (-55°C to +250°C)

Other inductor products are available for extreme temperature applications. Power ratings can range from a few milliwatts to thousands of Watts with up to 100 Amps of DC current. Maximum operating temperature range from -55°C to +250°C can be offered for specialized applications.

Model	Inductance Range (uH)	Typical Range (Q)	Test Frequency Range (MHz)	SRF Range (MHz)	Operating Temperature Range (°C)	Package (mm)
LXT26000	0.010 to 10	40 to 48	7.9 to 150	33 to 2000	-55 to +200	2.67 x 2.79
LXT30000	0.010 to 100	28 to 48	2.5 to 150	7.0 to 2000	-55 to +200	2.67 x 2.79

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Crystal Oscillators (-100°C to +300°C)

We provide High-Reliability solutions to meet all crystal oscillator needs. Our Extreme Temperature XOs are capable of operating in the range of -100°C to +300°C and are resistant to shock and vibration. Our XOs offer a broad selection of supply voltages, frequency ranges, and packaging options.

Model	Supply Voltage	Output Type	Frequency Range (MHz)	Frequency Stability (PPM)	Operating Temperature Range (°C)	Package (mm)
ETXO3225I	1.8 to 5.5	CMOS	0.032768	300	-55 to +150	3.2 x 2.5 SMD
ETXO7500I	1.8 to 5.5	CMOS	80 (max)	60 to 250	-100 to +240	5.0 x 7.2 SMD
ETXOI-A	1.2 to 18	CMOS	110 (max)	100, 250, 300	-100 to +300	12.95 x 12.95 Half-Dip Leaded
ETXOI-B	1.2 to 18	CMOS	110 (max)	100, 250, 300	-100 to +300	12.83 x 22.35 Full-Dip Leaded
ETXOI-C	1.2 to 18	CMOS	110 (max)	100, 250, 300	-100 to +300	6.60 height 8-pin TO-5 leaded
ETXOI-D	1.2 to 18	CMOS	110 (max)	100, 250, 300	-100 to +300	4.45 height 8-pin TO-5 leaded

Extreme Temperature Crystal Oscillator (ETXO): Case Study

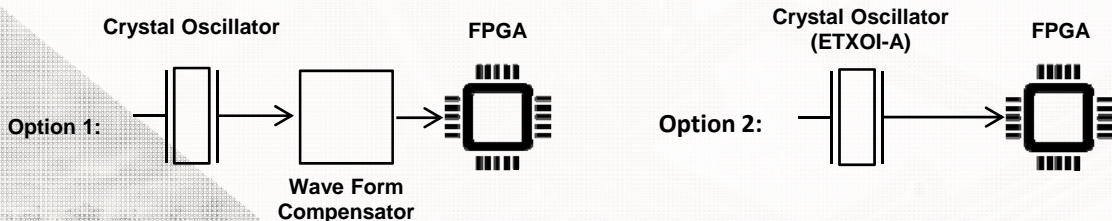
Dynamic Engineers held a meeting with an LWD advanced design group to listen to one of their manufacturing issues:

Problem:

- The customer requires that their internal FPGA chip for sensor data conversion be driven by a low jitter crystal oscillator reference clock operating at 150MHz. The original design utilizes an oscillator specified to operate only to 125°C. But there LWD tool operates at 150°C.
- In order to use the 150MHz XO at 150°C, the customer has implemented an additional screening process for the oscillator to be tested at 150°C. The number of good units (yield) is only 60%. 40% of the XO's must be scrapped.
- Also, the customer must add an additional IC chip between the oscillator and FPGA IC that serves as a waveform compensation function. This compensation restores the oscillator waveform back to its proper square wave characteristic and proper slew rate before entering the FPGA device.

Solution:

- Dynamic Engineers simply offered a 150MHz XO device solution that has been designed to operate at 150°C with NO YIELD LOSS, and NO WAVEFORM DISTORTION at 150°C. Now the customer has eliminated the additional sorting process, and additional compensating IC out of the BOM and testing process. Long term reliability is now greatly increased with the removal of screening and the extra IC component.



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HIGH TEMPERATURE COMPONENTS

Quartz Crystals (-55°C to +220°C)

Dynamic Engineers not only offers complete clock oscillator modules for extreme temperature environments, but is also able to sell the individual crystal plus IC driver chip to those manufacturers able to build their own clock oscillator products in their established oscillator operations. Customers are free to select various IC packaging options based on the assembly technology present in their assembly operations. Our crystal products in 3.2 mm x 5.0 mm SMD can maintain high reliability over -55°C to +220°C under high shock and vibration. Frequencies currently in production include: 12 MHz, 16 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz & 50 MHz.

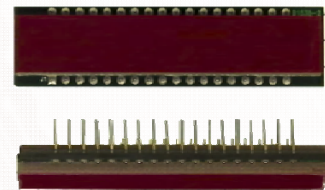
Parameter	Specification
Frequency Range	12 MHz to 100.00MHz
Load Capacitance(CL)	18pf Std, 8 - 60pF and Series available
Frequency Tolerance	±50ppm @ 25°C, Custom Options available
Temperature Tolerance	±250ppm Std, ±200ppm to ±300ppm available
Operating Temperature	0 to +200°C Std, Custom Options available
Storage Temperature	-55°C to +220°C
Shunt Capacitance (CO)	7pF max

Oscillator IC Driver (-60°C to +230°C)

Model	Supply Voltage	Output Type	Frequency Range (MHz)	Frequency Stability (PPM)	Operating Temperature Range (°C)	Package Options
XOIC-1	2.5 to 5.5	CMOS	32KHz to 25MHz	100, 250, 300	-60 to +230	Bare Die Tested Bare Die Ceramic Side-Brazed DIP Ceramic SOIC Gull-Wing Flat Pack w/ ePad
XOIC-2	2.5 to 5.5	CMOS	1 MHz to 50 MHz	100, 250, 300	-60 to +230	Bare Die Tested Bare Die Ceramic Side-Brazed DIP Ceramic SOIC Gull-Wing Flat Pack w/ ePad

Flash Memory (-55°C to +175°C)

Our Memory Modules are built to order in a broad range of capacities and package configurations, designed for high shock and high vibration downhole environments, with extensive testing to withstand temperatures up to 175°C and has been used successfully at much higher temperatures.



Model	Memory (MB)	Communication Type	Testing @ 175°C	Operating Temperature Range (°C)	Package (mm)
FM2MB	2	SPI Serial	> 1000 Hrs.	-55 to +175	27.94 x 27.94 x 2.20
FM4MB	4	SPI Serial	> 1000 Hrs.	-55 to +175	10.29 x 7.87 x 2.50
FM8MB	8	SPI Serial	> 1000 Hrs.	-55 to +175	20.32 x 7.87 x 3.30
FM32MB-A	32	SPI Serial	> 1000 Hrs.	-55 to +175	57.15 x 15.24 x 5.74
FM32MB-B	32	SPI Serial	> 2000 Hrs.	-55 to +175	77.47 x 15.24 x 5.82
FM64MB	64	SPI Serial	> 2000 Hrs.	-55 to +175	77.47 x 15.24 x 5.82
FM128MB	128	SPI Serial	> 2000 Hrs.	-55 to +175	77.47 x 15.24 x 5.82

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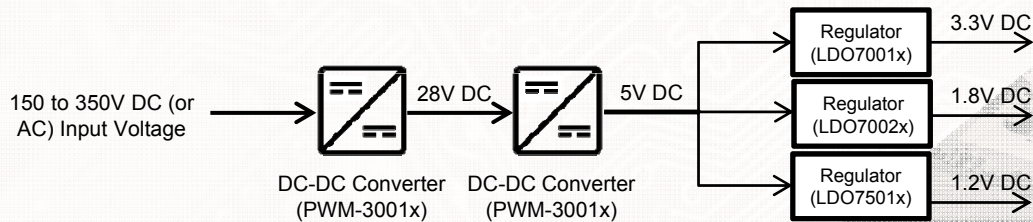


Dynamic Engineers, Inc.

HIGH TEMPERATURE COMPONENTS

Distributed Power Relationships In Down-hole Drilling Tools

Down-hole drilling tools consist of a series of step-down voltage stages from hundreds of DC or AC volts down to a point of load regulated DC voltage as low as 1.2V. Dynamic Engineers can offer IC solutions that serve each step down section of the power distribution network.



Pulse Width Modulators (-60°C to +230°C)

Model	Supply Voltage (V)	Description	Operating Temperature Range (°C)	Package Options
PWM-3001x	≤50	PWM Controller (DC/DC Converter Applications) Internal Linear Regulator (Selectable Asynchronous Pulse-Skip) Programmable Integrated Oscillator (Synchronization) Voltage Tracking Capabilities	-60 to +230	Bare Die Tested Bare Die Ceramic SOIC Ceramic Side-Brazed DIP Gull-Wing Flat-pack w/ ePad

Point Of Load Linear Regulators (-60°C to +230°C)

Dynamic Engineers offer a series of voltage regulators which are highly reliable which can operate beyond -60°C to +230°C, with stability over a continuous range of load capacitors. Various designs include bare die, shut down mode, monolithic design, ruggedized SMR or thru-hole packages are available.

Dynamic Engineers offers a unique class of voltage regulators designed for down-hole applications.

Model	Description	Operating Temperature Range (°C)	Package Options
SERIES REGULATORS			
LDO7001x	Input Voltage 2.8 to 5.5V Output Voltage 0.5 to 3.6V	-60 to +230	Tested Bare Die Gull-Wing Flat Pack w/ ePad Ceramic Side-Brazed DIP
LDO7002x	Input Voltage 3 to 30V Output Voltage 0.6 to 30V	-60 to +230	Bare Die Tested Bare Die Gull-Wing Flat Pack w/ ePad Metal Case (TO-254) Ceramic Side-Brazed DIP
LDO7501x	Input Voltage 2.8 to 40V Output Voltage 1.2 to 15V	-60 to +230	Tested Bare Die Ceramic SOIC Ceramic Side-Brazed DIP Gull-Wing Flat-pack w/ ePad
SHUNT REGULATORS			
SREG431	Variable Input Voltage Output Voltage 2.5 to 40V	-60 to +230	Bare Die Tested Bare Die Gull-Wing Flat-pack w/ ePad Ceramic Side-Brazed DIP

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MWD PRODUCTS

MWD Products

Dynamic Engineers offers complete MWD Products for your various downhole requirements.

Model	Designed for:	Operating Temperature Range (°C)	Size	Key Specifications
Mud-Pulse MWD-LWD Complete System	Hole-making Operating control of: Directional Horizontal wells Sidetracks	-40 to +175	Outer Diameter: 4.76 cm Length: 640.1 cm to 829.1 cm (depending on configuration)	<ul style="list-style-type: none"> Max Hydrostatic Pressure: 20,000 psi (137 MPa) Vibration Resistance: 20 GRMS, 30-1000 Hx Random Shock Rating: 1,000Gs, 0.5mSec, ½ Sine
Directional Module	Acting as the central control system of the MWD system	-40 to +175	Diameter: 3.45 cm Length: 74.2 cm	<ul style="list-style-type: none"> Compatible with conventional orientation modules Standard 21 pin connectors on each end
Gamma Module	Measuring naturally occurring radiation found in rock formations needed for geosteering and identifying rock lithologies	-50 to +177	Diameter: 3.45 cm Length: 39.0 cm	<ul style="list-style-type: none"> Vibration Resistance: 30G, 50 to 250 Hz Random Shock Rating: 1,000G Low Voltage Option: +15V to +30V High Voltage Option: +21V to +60V
Pulser	Transmits wellbore position, drillbit information, and directional data	Up to +175	Outer Diameter: 4.76 cm Length: 89.2 cm	<ul style="list-style-type: none"> Max Operating Pressure: 20,000 psi (137 MPa) Vibration Rating: 20 GRMS, 30-1000 Hz, Random
Surface Receiver	Pulse detection, tool configuration and logging-while-drilling capability	n/a	Length: 24.1 cm Width: 3.81 cm	<ul style="list-style-type: none"> Compatible with popular MWD tools and transducers Windows 2000, XP, and Vista compatible Wireless networking allows connection to multiple PCs
Pressure Transducer	Transmitting pressure based data	-40 to +110C	Length: 22.9 cm Width: 9.53 cm	<ul style="list-style-type: none"> 10K Transducers 10,000 psi maximum rating Electrical Input: 10-28VDC



Gamma Probe



Pulser Driver



Directional Module

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Dynamic Engineers, Inc.

MWD KIT & TOOL RENTAL, REPLACEMENT PARTS

MWD Kit & Tool Rental

Dynamic Engineers conveniently offers MWD Kit rentals, allowing your business more flexibility (easily upgrade obsolete technology) and capital savings. All kits are complete, field-ready, and can be customized to meet your specifications.

- Mud-Pulse MWD-LWD Complete System Kit
- Gamma Module Kit
- Universal Bottom Hole Orientation (UBHO) Subs

Mud-Pulse MWD-LWD Complete System Kit

The Mud-Pulse MWD-LWD Complete System Kit measures navigation and geophysical parameters while drilling. It includes a downhole section (electronic device, non-magnetic drill collar, pulse generator) and surface equipment (manifold pressure sensor, receiving device, computer), providing you with all the important options and features you need.

- | | | |
|---------------------------|-----------------------------|----------------------------|
| • 2 x Pulsers | • 2 x Computers | • 1 x Consumable Box |
| • 2 x Directional Modules | • 1 x Spare's Box | • 1 x Test Kit |
| • 4 x Batteries | • 2 x UBHO Subs | • 1 x Hand Tool box |
| • 2 x Rig Floor Displays | • 2 x Transducers | • 2 x Surface Receivers |
| • 2 x Printers | • 2 x Spearpoints | • All Cables |
| • Retrieval tools | • 1 x Fully Wireless System | • 2 x Lower end assemblies |
| • 1 x Consumable box | | |

Gamma Module Kit

Mineral elements that emit gamma radiation are characteristically associated with shale rock. The Gamma Module Kit measures that gamma radiation and helps geosteer your tool toward gas or oil-rich shale deposits.

- | | |
|-----------------------|------------------------|
| • 2 x Gamma Modules | • 1 x Printer |
| • 2 x Data Boxes | • 2 x Interface Cables |
| • 2 x Gamma Computers | • 1 x Software Key |

Universal Bottom Hole Orientation (UBHO) Sub

The Universal Bottom Hole Orientation (UBHO) Sub is a length of bent pipe located between a stationary drill pipe and the top of the motor in the downhole end of a drill. The UBHO Sub allows the operator to change the direction of the wellbore without having to withdraw the entire apparatus. It is typically used in Bottom Hole Assembly (BHA) directional drilling.

MWD Replacement Parts

Dynamic Engineers carries replacement parts for all of the MWD and Gamma Kits offered.

- | | |
|---------------------------|----------------------|
| • MWD Kit Components | • Hand Tools |
| • Ceramic & carbide parts | • Drill Pipe Screens |
| • MWD electronics | • Float Valves |
| • Moving Parts | • Storage Boxes |

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Extreme Temperature IC Solutions

- PMOS And NMOS Power Transistors
• Instrumentation Amplifiers For Sensor Front-end
• 10 Bit AD Converter
• High Speed Comparator
• Configurable Logic IC (4 Logic Functions)

Extreme Temperature IC Reliability

All Dynamic Engineers' extreme temperature semiconductor product families are tested for thousands of hours at temperatures well beyond their maximum operating point temperature limit.

This accelerated life testing is performed to make sure that devices will meet all specifications at the maximum operating temperature over the life of operation in the downhole oilfield environment.

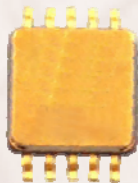
For each family the " number of parts " column represents the total number of devices included in the group tested at elevated temperature.

The " Hours to Date " column represents the number of hours each device was exposed to the elevated temperature limit.

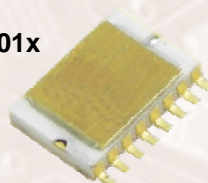
The " Cumulative Hours " column represents the " number of parts " column multiplied by the " Hours to Date " column for each device in the lot.

Table with 5 columns: Series, Product Type, Number of Parts, Hours to Date, Cumulative Hours. Rows include PT2N, LGMF-54, XOIC, LDO7001x, DHT-40, SREG431, HTVT-650, PWM-3001x, DHT-80.

LDO7001x



PWM-3001x



SREG431



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Sales@DynamicEng.com
TEL: (+86)-25-8471-1126



Dynamic Engineers, Inc.

DESIGN & TESTING

Custom Design Solutions

We understand the challenges our customers face as drilling environments become deeper, hotter, more complex, and harsher. Our comprehensive offering of services includes High temperature components and design of MWD, LWD, and Wire-line equipment. Dynamic Engineers, Inc. provides customized solutions for high temperature applications (150°C to 230°C), ruggedized to withstand high vibration, and are retrievable to minimize Lost in Hole costs and increased reliability.

- Development of high temperature rugged MWD electronics and mechanical components.
- Development for down-hole motor control and natural gamma radiation applications.
- Development of complete electro-mechanical down-hole tools used for drilling, wire-line and other applications.
- Development of surface hardware such as MWD Receivers, Electronic Data Recorder Systems, Automatic Drillers, Mud-logging Systems, and Fluid Processing Systems.
- Overall, DEI offers complete support of your design requirements, experience at selecting the right components, and improvements to take your designs to the next level.
- 150°C, 175°C, 200°C & 220°C DC to DC converters customized to meet your system requirements.

Environmental Testing

- Specialized Electrical And Environmental Testing
- Device Characterization
- Packaging
- Failure Analysis

Support Services

Dynamic Engineers has partnered with local manufacturers in Houston, Texas. We serve as an extension of their arms in:

- Preparation Of Export Related Documentation
- Negotiating Specifications
- Quality Control
- Introduction Of New Products
- Technical Support

Quality Statement

Dynamic Engineers strives to exceed customer expectations in everything we do always working on continuous improvement to reach ever higher levels of customer satisfaction. Our Quality Assurance team begins with a careful review of the customer's contract, quality requirements, and specifications. Next, they plan out the necessary steps to ensure customer requirements are met and distribute this information to the appropriate departments including Engineering, Manufacturing, and Purchasing. Effective coordination of all participating departments ensure the transfer of accurate information consistent with customer schedule requirements.

DISCLAIMER: This brochure represents a sampling of available models. Please consult our sales department for a more detailed and complete listing of all our products.

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