

# AC Motor Drive

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# AC Motor Drive

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## VISHAY components used for Motor Drives can include:

- Power MOSFETS
  - High-Power Modules
  - Diodes and Rectifiers
  - Capacitors
  - Resistors
  - Thermistors
  - Visible LEDs
  - Optical Isolators
  - Inductors / EMI Filters
  - Shunt Resistors
  - ESD Protection Devices
  - LDOs
  - Communications Interface ICs
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## Application Overview

A motor can be a simple induction machine that rotates with the connection of a simple AC voltage. In applications that require more precise control of speed, torque, or positioning, it is more common to use a 3-phase motor. In order to control this type of motor, signals must be generated that cause the motor to spin properly, using feedback to close the loop and regulate the desired parameters.

## AC Motor Drive : AC INPUT, Diode Bridges

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### Single Phase

Product Name	Status	Description	Features	Package	Q-Level
36MB60A		Glass Passivated Bridge Rectifier	600V, 35A	TH / Radial D-34	
GBPC3506A		Glass Passivated Bridge Rectifier	600V; 35A	TH / Radial GBPC	
GSIB1580		Glass Passivated Bridge Rectifier	800V; 15A	TH / Radial GSIB-5S	

### Three Phase

Product Name	Status	Description	Features	Package	Q-Level
100MT160PA		High Power Modules	3 phase, 1600V, 100A	MODULE MTP module	
70MT140PB		High Power Modules	3 phase, 1400V, 75A	MODULE MTP	

## AC Motor Drive : AC INPUT, Power Factor Correction

### Bulk Capacitor

Product Name	Status	Description	Features	Package	Q-Level
2222 102 series		Screw terminal aluminium capacitor	3300µF 490V 20%	TH / Radial	
2222 157 series		Snap-in aluminium capacitor	2200µF 420V 20%	TH / Radial	
MKP 1848 DC-Link	NEW	DC-link film capacitor	up to 400uF; up to 1200V no electrolyte, long life	TH / Radial	

### Inductor

Product Name	Status	Description	Features	Package	Q-Level
IHLP series		Surface-Mount Power Inductors	0.047 µH to 100 µH; IDC up to 60 Amps	SMD 1616 to 5050	

### PFC fast diode

Product Name	Status	Description	Features	Package	Q-Level
15ETX06		UltraFast Diode	600V, 15A, 18 nsec Trr	TH / Radial TO-220AC	
30EPH06		UltraFast Diode	600V, 30A, 35 nsec Trr	TH / Radial TO-247 (2 lead)	
8ETX06		UltraFast Diode	600V, 8A, 16 nsec Trr	TH / Radial TO-220AC	
HFA50PA60C		HexFRED Diode	600V, 50A, 75 nsec Trr	TH / Radial TO-247	

### PFC MOSFET

Product Name	Status	Description	Features	Package	Q-Level
IRF32N50K		Power MosFET	500V, Rds(on) = 160 Ω	TH / Radial TO-247	
IRFP460N		Power MosFET	500V, Rds(on) = 240 mΩ	TH / Radial TO-247	
IRFPS43N50K		Power MosFET	500V, Rds(on) = 90 mΩ	TH / Radial Super TO-247	

### PFC pre-charge diode

Product Name	Status	Description	Features	Package	Q-Level
10ETS08S		Standard Recovery Diode; High Surge rating;	800V, 10A cont. Current; 200 Amp surge;	SMD D2-Pak	

### Shunt resistor

Product Name	Status	Description	Features	Package	Q-Level
WSL series		Power Metal Strip Resistors	Low Resistance Value; Ideal for Current Sensing	SMD 0603 to 4527	

## AC Motor Drive : AC INPUT, X/Y Capacitors

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### Film RFI caps

Product Name	Status	Description	Features	Package	Q-Level
BFC2 336 60103		Film capacitor Y2 polypropylene	300V; 10nF; 20%	TH / Radial 5.0x11.0x17.5mm	
F1772 447 3200		Film capacitor X2 polyester	300 V; 0.47 $\mu$ F; 20%	TH / Radial 11.0x20.3x41.3mm	UL1283;1414; CSA 22.2 EN132400;IEC
F1772 522 3200		Film capacitor X2 polyester	300 V; 2.2 $\mu$ F; 20%	TH / Radial 17.8x32.3x41.3mm	UL1283;1414; CSA 22.2 EN132400;IEC

## AC Motor Drive : BIAS SUPPLY (off-line, flyback), Discretes

### Film RFI caps

Product Name	Status	Description	Features	Package	Q-Level
BFC2 336 60103		Film capacitor Y2 polypropylene	300V; 10nF; 20%	TH / Radial 5.0x11.0x17.5mm	
F1772 447 3200		Film capacitor X2 polyester	300 V; 0.47 $\mu$ F; 20%	TH / Radial 11.0x20.3x41.3mm	UL1283;1414; CSA 22.2 EN132400;IEC
F1772 522 3200		Film capacitor X2 polyester	300 V; 2.2 $\mu$ F; 20%	TH / Radial 17.8x32.3x41.3mm	UL1283;1414; CSA 22.2 EN132400;IEC

### Inductor

Product Name	Status	Description	Features	Package	Q-Level
IHLP series		Surface-Mount Power Inductors	0.047 $\mu$ H to 100 $\mu$ H; IDC up to 60 Amps	SMD 1616 to 5050	

### Multilayer Ceramic Chip Capacitors

Product Name	Status	Description	Features	Package	Q-Level
VJ X7R Dielectric		MLCC; for Decoupling and Filtering; Excellent Aging Characteristics; Wide Range of Voltage & Cap. Ratings	Capacitance: 100pF - 1 $\mu$ F 0402 - 3640 sizes	SMD EIA 0402...3640	

### Shunt resistor

Product Name	Status	Description	Features	Package	Q-Level
WSH2818		Power Metal Strip Resistors	Low Resistance Value; Ideal for Current Sensing	SMD 2818	
WSL, WSH series		Power Metal Strip Resistors	Low Resistance Value; Ideal for Current Sensing	SMD 0603 to 4527	

### Tantalum Capacitors

Product Name	Status	Description	Features	Package	Q-Level
292D		Solid Tantalum Chip Capacitors, TANTAMOUNT®, Lead Frameless Molded High CV; Low ESR	3 - 20 Volt , 1 $\mu$ F - 47 $\mu$ F	SMD 0805 -2012	
592D		Solid Tantalum Chip Capacitors, TANTAMOUNT®, Conformal Coated, Low Profile; Maximum C/V,	4 - 35 V; 1 $\mu$ F - 3300 $\mu$ F; Cas Hight 2.5mm -1.3mm	SMD A - X Case	
595D		Solid Tantalum Chip Capacitors, TANTAMOUNT®, Conformal Coated, Maximum CV, Low ESR	4 - 50 V; 0,1 $\mu$ F - 1500 $\mu$ F	SMD T - R Case	

### Transformer

Product Name	Status	Description	Features	Package	Q-Level
Custom Transformer		Dale Custom Magnetics PWM;PSM and FM Transformers; Power;Filter; Switchmode Transformers;	up to 500MHz 10 Amp max. 50-400Hz, up to 100VA;	TH / SMD Custom	UL; CSA; IEEE; VDE;

### TVS and ESD protection

Product Name	Status	Description	Features	Package	Q-Level
GSOT03 to GSOT36		ESD Protection Diode Low Capacitance; Single Line	VZT=3.3-36V, C=80-800pF	SMD SOT-23	
GSOT03-HT3 to GSOT36-HT3	NEW	ESD Protection Diode Low Capacitance; Single Line	VZT=3.3-36V, C=80-800pF	SMD LLP75-3B	
P4KE series		Transient Voltage Suppressor Diodes	Clamps at 10.5 to 772V	TH / Axial DO-204AL (DO-41)	

## AC Motor Drive : BIAS SUPPLY (off-line, flyback), Feedback

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### Opto Isolator

Product Name	Status	Description	Features	Package	Q-Level
4N25		Optocoupler, Phototransistor Output	Isolation Test Voltage: 5300 VRMS	SMD SMD-6, DIP-6	
CNY17-3		Optocoupler, Phototransistor Output	Isolation Test Voltage: 5300 VRMS	SMD SMD-6, DIP-6	

## AC Motor Drive : BIAS SUPPLY (off-line, flyback), Power Semiconductors

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### Flyback Diode

Product Name	Status	Description	Features	Package	Q-Level
16CTQ100		Schottky	100V, 16A, dual	TH / Radial TO-220AC	
V20100S	NEW	Schottky	100V, 20A, single	TH / Radial TO-220AC	

### Flyback Switch

Product Name	Status	Description	Features	Package	Q-Level
IRFIBE30G		Power MosFET	800V, Rds(on) = 3 $\Omega$	TH / Radial FullPak TO-220	
IRFPE40		Power MosFET	800V, Rds(on) = 2 $\Omega$	TH / Radial TO-247	
IRFPE50		Power MosFET	800V, Rds(on) = 1.2 $\Omega$	TH / Radial TO-247	

## AC Motor Drive : CONTROL AND GATE DRIVE, Capacitors

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### Multilayer Ceramic Chip Capacitors

Product Name	Status	Description	Features	Package	Q-Level
VJ X7R Dielectric		MLCC; for Decoupling and Filtering; Excellent Aging Characteristics; Wide Range of Voltage & Cap. Ratings	Capacitance: 100pF - 1 $\mu$ F 0402 - 3640 sizes	SMD EIA 0402...3640	

### Tantalum Capacitors

Product Name	Status	Description	Features	Package	Q-Level
292D		Solid Tantalum Chip Capacitors, TANTAMOUNT®, Lead Frameless Molded High CV; Low ESR	3 - 20 Volt , 1 $\mu$ F - 47 $\mu$ F	SMD 0805 -2012	
592D		Solid Tantalum Chip Capacitors, TANTAMOUNT®, Conformal Coated, Low Profile; Maximum C/V,	4 - 35 V; 1 $\mu$ F - 3300 $\mu$ F; Cas Hight 2.5mm -1.3mm	SMD A - X Case	
595D		Solid Tantalum Chip Capacitors, TANTAMOUNT®, Conformal Coated, Maximum CV, Low ESR	4 - 50 V; 0,1 $\mu$ F - 1500 $\mu$ F	SMD T - R Case	

## AC Motor Drive : CONTROL AND GATE DRIVE, Communications

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### Communication Bus Interface IC

Product Name	Status	Description	Features	Package	Q-Level
SI9200EY		CAN bus driver and receiver	5 Volts - 120ns - 50 pF	SMD SO-8	

## AC Motor Drive : CONTROL AND GATE DRIVE, Discretes

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### Feedback Resistors

Product Name	Status	Description	Features	Package	Q-Level
ACAC 0612		Professional Flat Chip Resistor Array	Thin Film, tight TCR	SMD 0612	

### LED indicators

Product Name	Status	Description	Features	Package	Q-Level
TLMH3100		SMD LEDs with exceptional brightness	Indicator and backlight in office equipment	SMD PLCC-2	

### Linear Reg for Encoder Power

Product Name	Status	Description	Features	Package	Q-Level
Si9181		Micropower 350-mA CMOS LDO Regulator	Vin=2.6V; Vout=5Vmax; 350 mA OUT;	SMD TSSOP-8	
Si9182		Micropower 350-mA CMOS LDO Regulator	Vin=2.6V; Vout=5Vmax; 250 mA OUT;	SMD MSOP-8	

### Switching diode

Product Name	Status	Description	Features	Package	Q-Level
1N4148WS		Small Signal Switching Diodes	VRRM= 50-75Volts; IFRM = 350mA;	SMD SOD-323	
BAS16WS-V		Space saving SMD Packages in SOD323	VRRM= 75Volts	SMD SOD-323	
BAV19WS		Fast Switching	VRRM= 120-250Volts; IFRM=625mA	SMD SOD-323	

### Zener clamp diodes

Product Name	Status	Description	Features	Package	Q-Level
SMZJ series		Low Impedance Surface Mount Zener	1.5Watt, 9.1 to 68 Vz	SMD SMBJ	

## AC Motor Drive : CONTROL AND GATE DRIVE, ESD Protection

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### ESD Protection Diodes

Product Name	Status	Description	Features	Package	Q-Level
GSOT03 to GSOT36		ESD Protection Diode Low Capacitance; Single Line	VZT=3.3-36V, C=80-800pF	SMD SOT-23	
GSOT03-HT3 to GSOT36-HT3	NEW	ESD Protection Diode Low Capacitance; Single Line	VZT=3.3-36V, C=80-800pF	SMD LLP75-3B	

## AC Motor Drive : CONTROL AND GATE DRIVE, Gate Drive

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### Gate Drivers

Product Name	Status	Description	Features	Package	Q-Level
LPE-3325		gate drive transformer	Surface Mount Transformer	SMD 6.5x8.2x5.21mm	
VO3120	Soon	Opto IGBT & MOSFET Driver	2.5A drive current	SMD SO-8, DIP-8	

## AC Motor Drive : CONTROL AND GATE DRIVE, Isolation

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### Opto Isolator

Product Name	Status	Description	Features	Package	Q-Level
4N25		Optocoupler, Phototransistor Output	Isolation Test Voltage: 5300 VRMS	SMD SMD-6, DIP-6	
CNY17-3		Optocoupler, Phototransistor Output	Isolation Test Voltage: 5300 VRMS	SMD SMD-6, DIP-6	

## AC Motor Drive : INVERTER (DC/AC) OUTPUT, Discretes

### Braking resistor

Product Name	Status	Description	Features	Package	Q-Level
RSO 30x250 series		Wirewound High Power Resistor	5R1 - 10R 350W	TH / Screwed Tubes 30x250mm	
RW 20x117 series		Wirewound High Power vitreous resistor	3K3 - 3K9 80W	TH / Screwed Tubes 20x117mm	

### Ceramic HF Decoupling Capacitors

Product Name	Status	Description	Features	Package	Q-Level
VJ X7R Dielectric		MLCC; for Decoupling and Filtering; Excellent Aging Characteristics; Wide Range of Voltage & Cap. Ratings	Capacitance: 100pF - 1 $\mu$ F 0402 - 3640 sizes	SMD EIA 0402...3640	

### De-Saturation diodes

Product Name	Status	Description	Features	Package	Q-Level
US1M		Surface Mount Ultrafast Rectifier	1000V, 1A, 75nsec	SMD SMA	

### Electrolytic caps

Product Name	Status	Description	Features	Package	Q-Level
2222 102 series		Screw terminal aluminium capacitor	3300 $\mu$ F 490V 20%	TH / Radial	
2222 157 series		Snap-in aluminium capacitor	2200 $\mu$ F 420V 20%	TH / Radial	

### Film caps

Product Name	Status	Description	Features	Package	Q-Level
2222 368 series		Snubber capacitor	1200V 1 $\mu$ F 20%	TH / Radial 22.0x38.0x44.0mm	

### Shunt resistor

Product Name	Status	Description	Features	Package	Q-Level
WSL, WSH series		Power Metal Strip Resistors	Low Resistance Value; Ideal for Current Sensing	SMD 0603 to 4527	

### Temp Sensor

Product Name	Status	Description	Features	Package	Q-Level
2381 645 90169		NTC Thermistor, Lug Sensor	10K $\Omega$ nominal; 5% tolerance	TH / Radial Ring-tongue Lug	

### Ultrafast Bootstrap diodes

Product Name	Status	Description	Features	Package	Q-Level
US1J		Surface Mount Ultrafast Rectifier	600V, 1A, 75 nsec	SMD SMA	

## AC Motor Drive : INVERTER (DC/AC) OUTPUT, Modules

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### High Power Module

Product Name	Status	Description	Features	Package	Q-Level
GB15RF60K		IGBT PIM Module; Complete w Bridge, Brake & Inverter;	600 V; 15 A at 80C	MODULE Econo2	

## AC Motor Drive : INVERTER (DC/AC) OUTPUT, Power Semiconductors for 3-# Driver Bridge

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### Braking or Inverter Switch

Product Name	Status	Description	Features	Package	Q-Level
IRFP32N50K		Power MosFET	500V, Rds(on) = 160 mΩ	TH / Radial TO-247	
IRFP460N		Power MosFET	500V, Rds(on) = 240 mΩ	TH / Radial TO-247	
IRFPS40N60K		Power MOSFET	600V, Rds(on) = 130 mΩ	TH / Radial Super TO-247	

### High Power Module

Product Name	Status	Description	Features	Package	Q-Level
GB15XP120KT		"Six-Pack" 3phase IGBT bridge	1200 V; 17 A at 100C	MODULE MTP	
GB30XF60K		"Six-Pack" 3phase IGBT bridge	600V; 30A at 80C	MODULE Econo2	

### Recirculating Diodes

Product Name	Status	Description	Features	Package	Q-Level
HFA25PB60		HexFRED Diode	600V, 25V, 75 nsec trr	TH / Radial TO-247 (2 lead)	

