



100 kW Class Power
Inverter Design Kit for
ASIL-D Functional Safety
Compliance

EV Power Inverter Control Reference Platform

System control design enablement kit with functional safety support for developing ASIL-D high voltage power inverters for electric vehicle traction motors.

OVERVIEW

The NXP EV power inverter control reference platform provides a hardware reference design, system enablement software, and functional safety enablement to develop a complete ASIL-D compliant high voltage, high power traction motor inverter for electric vehicles.

FEATURES AND BENEFITS

- ▶ System control enablement kit for designing 100 kW class power inverters
- ▶ Efficient system BOM designed for ASIL-D safety requirements
- ▶ Basic software enablement with inverter services layer, drivers & SDK
- ▶ ± 0.1 high accuracy software RDC with advanced motor control software
- ▶ Drives up to ± 15 A into a broad range of IGBT and SiC power devices
- ▶ < 2 us iSense compatible 2 level IGBT OC protection with soft shutdown
- ▶ 5 kV galvanic signal isolation compatible with IGBTs up to 1700 V
- ▶ Standard signal interfaces for motor resolvers and output current sensors
- ▶ Support for redundant CAN bus interfaces

APPLICATIONS

- ▶ EV motor power inverters
- ▶ High voltage DC to DC boost circuits
- ▶ High voltage on-board chargers

FEATURED PRODUCTS

NXP components featured in the platform include:

- ▶ **GD3100** isolated IGBT gate driver with < 2 us short-circuit protection
- ▶ **MPC5775E** high performance ASIL-D MCU with advanced motor control libraries and software resolver
- ▶ **FS65** robust ASIL-D SBC with fail-silent and Grade 0 capabilities
- ▶ **TJA1051T** redundant high-speed CAN bus interface



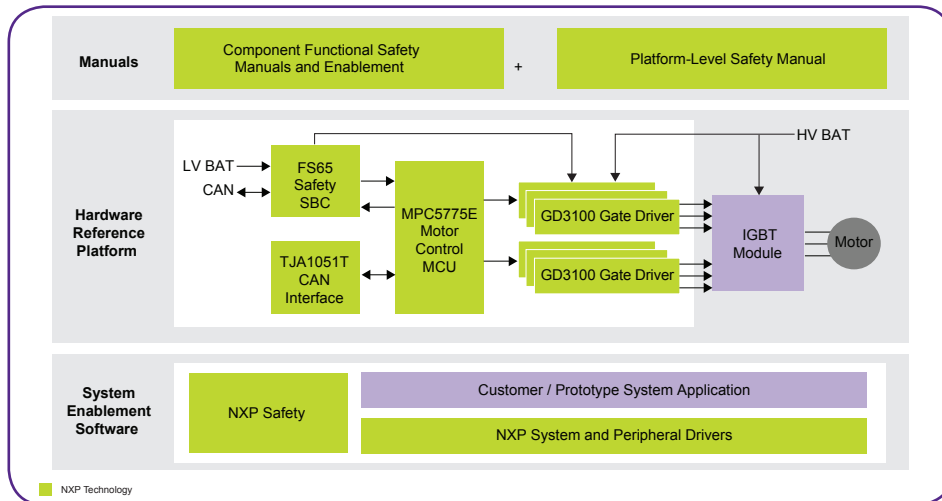
KIT INCLUDES

Offerings	Type	Offering Packages	
		Inverter Platform Enablement Kit	Inverter Platform Safety Kit *
Hardware design package (schematics & layout)	DOC	DL	
NXP device datasheets	DOC	DL	
NXP device functional safety documents	DOC	DL	
NXP device software drivers (GD3100 & FS65)	SW	DL	
Reference design enablement kit including control, driver, RDC interface, & sensor boards	HW	X	
BSW with service level, SDK, driver & GUI software	SW	DL	
Reference design enablement kit user manual	DOC	DL	
Design guide application note	DOC	DL	
BSW user manual	DOC	DL	
System proof-of-concept prototype test results	DOC	DL	
Safety basic software & safe-state library	SW		DL
Basic safety software user manual	DOC		DL
Inverter safety concept manual			
Analysis & fault reaction matrix	DOC		DL

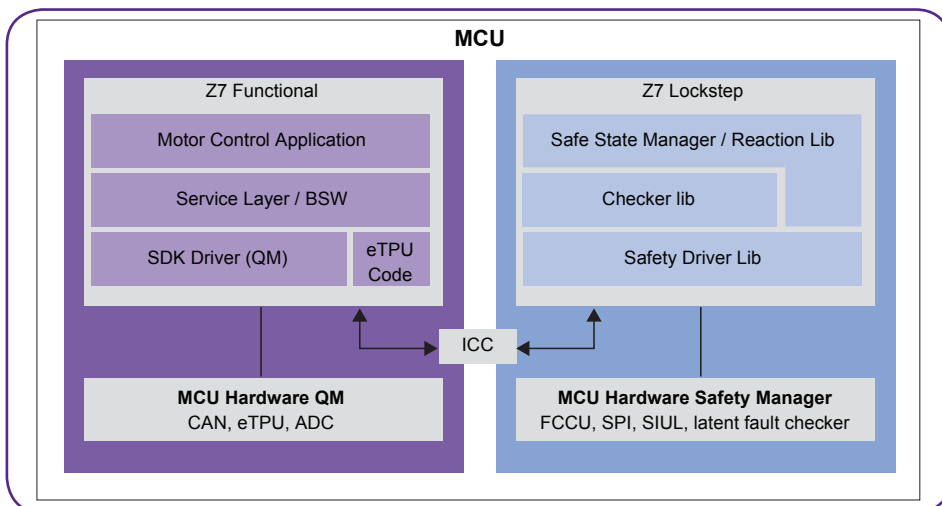
DL = downloadable from NXP

* Available by end of 2019

SYSTEM BLOCK DIAGRAM



SYSTEM ENABLEMENT AND FUNCTIONAL SAFETY MANAGEMENT SOFTWARE



The Reference Platform has been designed into an evaluation prototype demonstrating >98 % electrical efficiency operating from 340 V supply voltage. It is designed to interface to a Fuji M653 IGBT module rated for 800 A / 750 V operation (purchased separately from Fuji Electronics).

EVALUATION PROTOTYPE PERFORMANCE SUMMARY

Inverter Performance Summary		
Parameter	Value	Units
Operating Input Voltage Range	240-420	VDC
Maximum Output ¹	150	KVA
Nominal Voltage	340	VDC
Peak Current ²	420	A, rms
Control Input Supply Voltage Range ³	8.5 - 16	VDC
Motor Operating Speed	0-10,000	RPM
PWM Switching Frequency	3-12	kHz
Control Type	current/ speed/ torque	
Maximum Electrical Efficiency	98	%
Communication Interface	CAN	
Inverter Mechanical Envelope	28 x 28 x 15.43	cm
Power Devices	IGBT	1 module
Standby Power Consumption	<1	mA
HV Bus Capacitance	440	uF

¹ Measurement conditions: HV bus capacitance of 440 uF, Fuji M653 IGBT module

² 1K - 3K RPM

³ Range extension to 18 VDC is possible with hardware design update

www.nxp.com/EVinverterPlatform

NXP and the NXP logo are trademarks of NXP B.V. All other product or service names are the property of their respective owners. © 2019 NXP B.V.

Document Number: EVPOWERINVRDFS REV 0