Analog— robust, reliable performance

Small Engine Solutions

Powered by SMARTMOS® technology, NXP®'s small-engine portfolio offers three easy-to-use engine control devices to deliver a cost-optimized IC solution for managing one- and two-cylinder engines.

TARGET APPLICATIONS

Small engine control for:

▸ Motor scooters

▸ Small motorcycles

▸ Lawn mowers

▸ Lawn trimmers

▸ Snow blowers

▸ Chain saws

▸ Gasoline-driven electrical generators

▸ Outboard motors

OVERVIEW

With up to six drivers, three pre-drivers, a 5.0 V regulator for the microcontroller, a protected external sensor supply, and a high level of integration, NXP's small-engine portfolio offers an ideal configurable response to contemporary market requirements (Euro 4/5 and OBDII) from low-end to high-end applications. Diagnostic and protection features present on all outputs allow systems to operate with greater safety.

FEATURES AND BENEFITS

▸ High level of integration means discrete devices on PCB can be eliminated, saving cost and improving reliability

▸ Diagnostic and protection features such as short circuit, overcurrent, open load, short to GND and overtemperature present on all outputs allow applications to operate with greater safety

▸ Multifunctional and configurable driver provides a flexible device to drive ignition, injection, O_2H, MIL, fuel pump and power relay features

▸ Innovative features such as VRS automatic mode provide better noise immunity in cranking mode

NXP EASY-TO-USE SMALL ENGINE SOLUTION
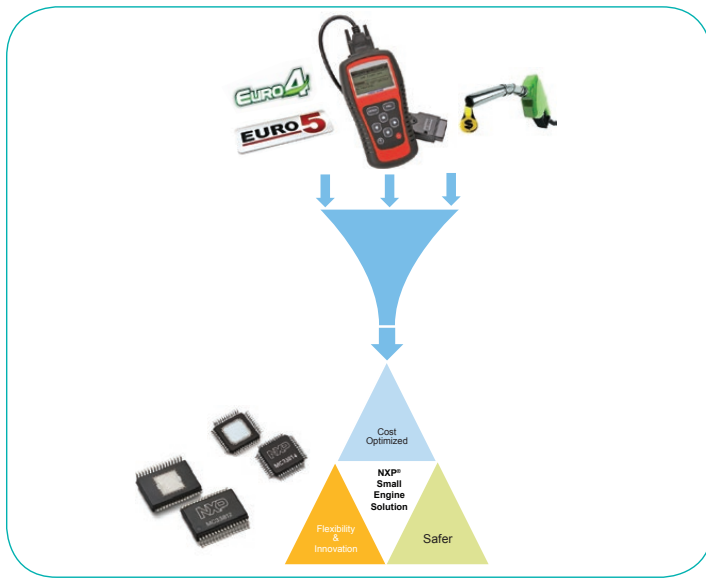
NXP PORTFOLIO

NXP provides a wide range of u-chip solutions to address all market segments of one-cylinder and two-cylinder applications.

ENGINE CONTROL KEY PERFORMANCE

	One-Cylinder Application		Two-Cylinder Application
	Low-End MC33812	Mid-End MC33813	Mid-/High-End MC33814
Operating voltage	4.7 V <=> 36 V	4.5 V <=> 36 V	4.5 V <=> 36 V
5 V MCU supply	Yes	Yes (200 mA)	Yes (200 mA)
5 V tracking for sensor supply		Yes (100 mA)	Yes (100 mA)
Fuel injector driver	x 1 $R_{DS(on)}$=0.4 Ω, ILIMIT=3.0 A	x 1 $R_{DS(on)}$=0.6 Ω, ILIMIT=1.8 A, to drive typical 12 Ω high-impedance injectors	x 2 $R_{DS(on)}$=0.6 Ω, ILIMIT=1.8 A, to drive typical 12 Ω high-impedance injectors
Relay driver (fuel pump, power relay)	x 1 $R_{DS(on)}$=0.4 Ω, ILIMIT=3.0 A	x 2 Rout1 : $R_{DS(on)}$=0.4 Ω, ILIMIT=3.0 A Rout2 : $R_{DS(on)}$=1.5 Ω, ILIMIT=1.2 A	x 2 Rout1 : $R_{DS(on)}$=0.4 Ω, ILIMIT=3.0 A Rout2 : $R_{DS(on)}$=1.5 Ω, ILIMIT=1.2 A
MIL lamp driver	x 1 $R_{DS(on)}$=1 Ω, ILIMIT=1.0 A	x 1 $R_{DS(on)}$=1.5 Ω, ILIMIT=1.2 A	x 1 $R_{DS(on)}$=1.5 Ω, ILIMIT=1.2 A
Programmable tachometer driver		$R_{DS(on)}$=20 Ω, I shutdown=60 mA	$R_{DS(on)}$=20 Ω, I shutdown=60 mA
Ignition driver	x 1 IGBT/Darlington pre-driver	x 1 IGBT/MOS pre-driver	x 2 IGBT/MOS pre-driver
02 sensor heater driver		x 1 IGBT/MOS pre-driver	x 1 IGBT/MOS pre-driver
VRS interface		Yes (cranking/running mode + manual/automatic mode)	Yes (cranking/running mode + manual/automatic mode)
ISO-9141	Yes	Yes	Yes
Keyswitch logic		Yes	Yes
Watchdog	Yes	Yes	Yes
MCU communications	Parallel	Parallel and SPI	Parallel and SPI
Operating temperature	-40 °C to +125 °C	-40 °C to +125 °C	-40 °C to +125 °C
Package type	32 SOICW EP	48 LQFP EP	48 LQFP EP

TWO CYLINDER TYPICAL APPLICATION
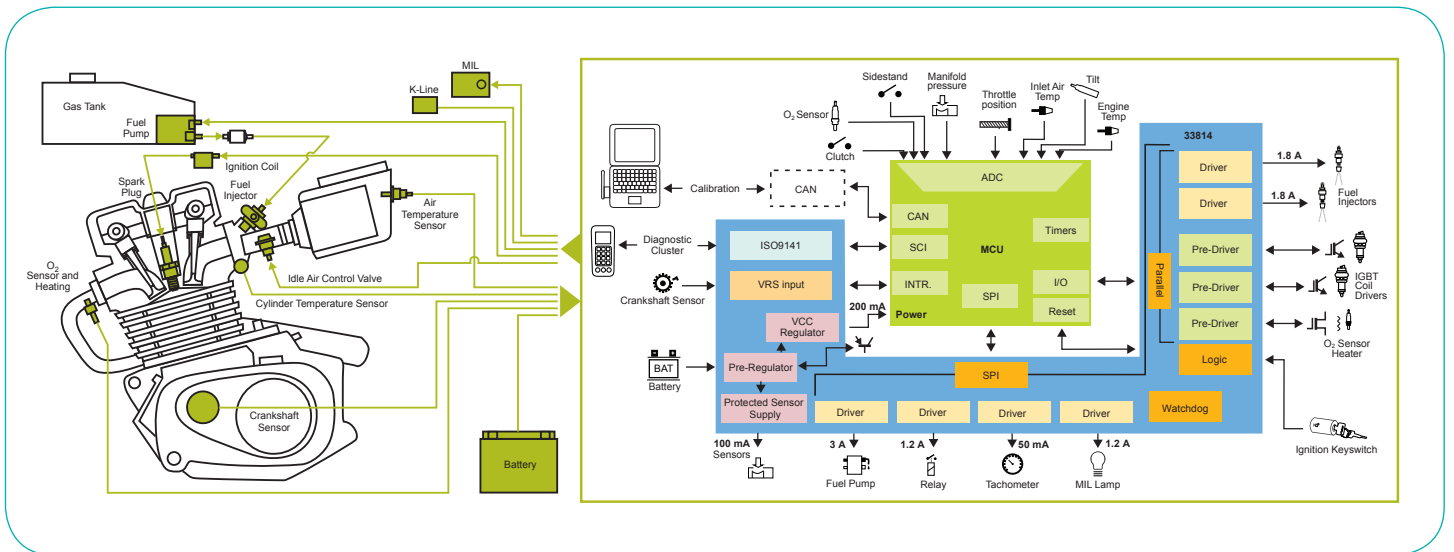
RECOMMENDED DEVICES

Category	Products	Description
Microcontrollers (MCU)	Kinetis® EA (KEA): ultra-reliable KEA automotive and industrial MCUs built on ARM® cores	32-bit MCUs built on ARM cores, up to 128 KB flash and up to 16 KB RAM
	S12XS: automotive and industrial microcontrollers (MCUs)	16-bit automotive microcontroller
	S12P: automotive and industrial microcontrollers (MCUs)	Low-cost 16-bit automotive microcontroller
	S32K116: ARM-based automotive microcontrollers	ARM M0+ core microcontroller with CAN-FD and security
Motor driver/H-Bridge	MC33926: H-Bridge, brushed DC motor driver	5 to 28 V, 5 A, 20 kHz
	MC33879: configurable octal serial switch	Eight (8) independent configurable switches to drive stepper motor
	MC33HB2001: SPI programmable H-Bridge brushed DC motor driver	5 to 28 V, 10 A, >20 kHz
Map Sensor	MPXx6115: gauge and absolute pressure sensor	5 V, 15/115 kPa, SOP 8, rail
Magnetic Sensor	KMA221 MR-based angular sensor	Functional safety features throttle position sensor, SOT1118, 5 V, analog linear
CAN	TJA1057 high-speed CAN—Mantis family	Up to 1 Mbit/s support, -40 °C to 125 °C , SO8
	TJA1057GT high-speed CAN FD—Mantis family	Up to 5 Mbit/s support, -40 °C to 125 °C, SO8
	TJA1044 high-speed CAN—Mantis family with Standby mode	Up to 1 Mbit/s support, -40 °C to 125 °C, SO8
	TJA1044GT high-speed CAN FD—Mantis family with Standby mode	Up to 5 Mbit/s support), -40 °C to 125 °C, SO8

ORDERABLE PART NUMBERS

Part Number	Temp. Range (Ambient)	Package	Orderable Kit Details
MC33812EK	-40 to +125 °C	32 SOICW-EP	KIT33812EKEVBE
MC33813AE	-40 to +125 °C	48 LQFP-EP	KIT33813AEEVBE
MC33814AE	-40 to +125 °C	48 LQFP-EP	KIT33814AEEVBE

A LEADER IN ANALOG SOLUTIONS

Expanding on more than 30 years of innovation, NXP is a leading provider of high-performance products that use SMARTMOS technology, combining digital, power and standard analog functions. We supply analog and power management ICs that are advancing the automotive, consumer, industrial and networking markets. Analog solutions interface with real world signals to control and drive for complete embedded systems.