



Using Optocouplers on Differential Automotive Data Lines for Wake-Up and Power Activation

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OVERVIEW

Modern automotive systems require low standby power combined with reliable wake-up functions. In applications such as displays, cameras, infotainment systems, and distributed ECUs, subsystems can be activated only when communication activity is detected on a differential data line.

Vishay's [VOMA618A](#) optocoupler series is well suited for this function, providing galvanic isolation while generating a reliable wake-up or power-enable signal from communication activity.

PRINCIPLE OF OPERATION

The optocoupler can monitor activity on a differential communication interface while providing electrical isolation between the communication domain and the local power control circuitry.

When communication activity is detected, the:

- Optocoupler LED is activated
- Output transistor switches
- Wake-up or enable signal is generated
- Subsystem power supply is activated

This approach can be used with interfaces such as APix-3, CAN / CAN-FD, Automotive Ethernet, FlexRay, LIN, RS-485, and other differential communication systems.

ADVANTAGES

- **Galvanic Isolation:** improves EMC behavior and protects sensitive electronics from disturbances
- **Low Standby Power:** allows the main subsystem to remain powered down until required
- **Simple Integration:** the wake-up signal can directly control PMIC enable pins, load switches, MOSFET stages, or ECU wake-up inputs
- **Improved System Robustness:** reduces fault propagation between communication and power domains

DESIGN CONSIDERATIONS

The design should take parameters such as signal amplitude, switching thresholds, wake-up response time, temperature, and CTR into account. Considerations regarding CTR characteristics are described in the [Application Note 45](#).

RC filtering may be added to avoid false triggering caused by noise or transient signals.

CONCLUSION

Optocoupler-based wake-up detection provides a simple, isolated, and robust solution for automotive low power architectures. It enables reliable subsystem activation while improving EMC performance and system protection.

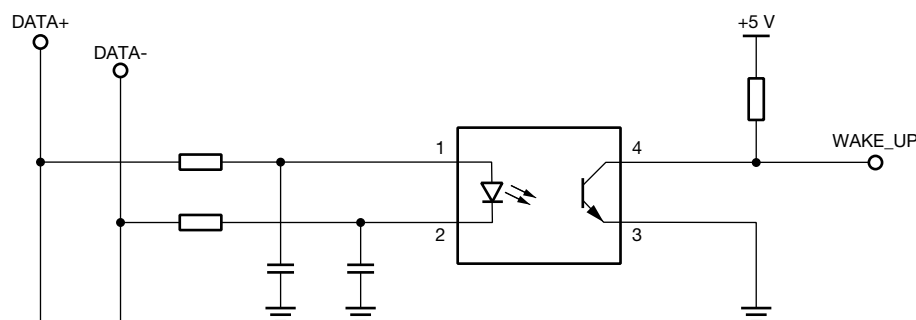


Fig. 1 - Wake-Up Detection Circuit With the VOMA618A