Designing reliable, low and medium voltage electronic power systems has been made easier with the introduction of the SCALE-iDriver™ IGBT and power MOSFET gate driver from Power Integrations. The new drivers incorporate Power Integrations’ proprietary FluxLink™, a solid insulator, magneto-inductive coupling, communications technology. The FluxLink interface and eSOP package provide the reinforced galvanic isolation required to meet VDE0884-11 and IEC60747-17, along with very high electromagnetic interference (EMI) and magnetic field immunity, allowing manufacturers to easily comply with IEC61000-4-8 and IEC61000-4-9 standards.
The internal isolation barrier, FluxLink, between the low voltage and high voltage sides of the SCALE-iDriver device replaces traditional optocouplers. This improves reliability, since both input LED and output phototransistor which are parts of the optocoupler solution are generally temperature unstable and degrade over time. [1,2,3]. Additionally, FluxLink technology provides full safety isolation in the event of a system failure, caused for example, by an IGBT Collector Gate short.

For other driver approaches that do not use FluxLink technology, such failure modes destroy not only the IC function on the secondary side but also compromise the isolation between the primary and secondary sides. The high speed bi-directional communications interface between the high voltage-side and fault monitoring functions (secondary side) and the low voltage control side and interface functions (primary side) has a propagation delay of only 260 nS, allowing the SCALE-iDriver device to reliably switch at up to 75 kHz. The new driver incorporates enhanced safety features, integrating functions previously performed by external components. Therefore the complete driver board can be simplified with a reduced BOM count and enhanced reliability.

The SCALE-iDriver family has a working voltage of up to 950 V and devices are available with three peak output current ratings: 2.5 A (SID1132K), 5.0 A (SID1152K) and 8.0 A (SID1182K). This high peak drive current allows the SCALE-iDriver to directly drive IGBTs with collector currents up to 600 A. For gate drive requirements in excess of 8.0 A, the SID1182K gate driver IC may be used with an external amplifier (current booster) to achieve 15 A or more with full safety functionality. Safety features include short-circuit protection (DESAT), Advanced Soft Shut Down (ASSD), primary side and secondary side Under Voltage Lockout (UVLO) and temperature compensated output impedance.

Power supply design requirements have been simplified; drivers only require a single +5 V supply for the primary side and a single 25 V (typical) unregulated supply for the secondary side. The SID11x2K gate driver has an on-chip power management function which divides the 25 V supply internally: the 15 V rail is stabilised and a negative rail is created as 25 V - 15 V = -10 V. This architecture only requires the addition of external capacitors to match the requirements of the
specific IGBT to be driven. Gate drive commands (PWM) from a microcontroller are applied to the input (IN) pin. Drive signals are transferred across the isolation barrier to the gate high (GH) and gate low (GL) pins. This split drive allows different gate turn-on / turn-off resistor values to be used to optimize control semiconductor switching characteristics, without the need of a diode.

Primary and secondary fault detection and reporting enhances system reliability and safety. If the primary side VCC or secondary side VISO or VEE falls below the defined UVLO threshold, the output (SO) pin asserts a logic low signal to indicate a fault. This same feature enables safe power-on and power-off, even in the event of a slow supply voltage slew rate. The driver family also corrects any short drive pulses (normally caused by input noise incorrectly asserting the end of a pulse). If the input detects a pulse shorter than the TGE(MIN) threshold on the IN-pin, the driver will automatically extend the duration of the output drive signals on GH and GL to TGE(MIN).

The secondary side also has sophisticated fault monitoring which detects power supply under-voltage and semiconductor short-circuits. Upon detection of desaturation conditions, the controller activates the Advanced Soft Shut Down (ASSD) to protect the power switches, driving the SO pin to ground. A short-circuit on any of the power switching devices is detected using the semiconductor desaturation effect. If the voltage on VCE exceeds a safety threshold (optimized for IGBT applications), the driver turns off the power switches with a controlled collector current-slope, which limits the VCE overvoltage excursion, keeping it below the maximum permissible collector-emitter voltage.
SCALE-iDriver - Revolutionary High-Voltage IGBT Driver Family

ASSD @ Tvj = 25 °C, ISC (2170 A), VDC = 600 V

Switching-off @ Tvj = 25 °C, Ic (450 A), VDC = 600 V

SCALE-iDriver products have been developed for high reliability industrial applications where performance and reliability are essential. Power Integrations has also developed an advanced eSOP power package which provides 9.5 mm of creepage and clearance which combined with the reinforced isolation provided by the FluxLink technology makes for an unrivalled reliability. Together
with its simple external power supply requirements, the high level of functionality of the SCALE-iDriver family permits the use of two-layer PCBs, reducing bill of material (BOM) costs.

**Existing Solution, XXXX-xx2x + Booster (6 A)**

**PI Solution, SID1182K (8A)**
The SCALE-iDriver family of gate drivers enables applications to meet IEC60664-1 specifications; SCALE-iDriver devices are UL and CSA recognized according to UL1577 – file number E358471 - and have been certified to the VDE0884-10 standard. Furthermore, the SCALE-iDriver family has also been designed to meet future standards such as VDE0884-17 and IEC60747-17. All the parts in the family operate up to 125 °C and are 100 % tested during production using both hi-pot and partial discharge techniques along with functionality testing designed to ensure safety.

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