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New 600 V and 1200 V FRED Pt[®] Gen 5 Hyperfast Rectifiers in D²PAK 2L Package Deliver Improved Erec and Lower Q_{rr} to Increase Efficiency in AC/DC and DC/DC Power Stages

Vishay Semiconductors is extending its offering of 600 V and 1200 V FRED Pt[®] Gen 5 hyperfast rectifiers with 24 new devices in the D²PAK 2L (TO-263AB 2L) package. Featuring a unique combination of low conduction and switching losses, the rectifiers are designed to increase the efficiency of medium frequency converters and of hard- and soft-switched or resonant designs.

Compared to previous-generation solutions, the 600 V devices deliver a 90 % improvement in reverse recovery energy (Erec), without compromising on conduction losses. The 1200 V rectifiers offer the same forward voltage as competing solutions, while offering up to 40 % lower switching losses and Q_{rr}, providing a cost-effective alternative for applications with frequencies in the range of 50 kHz.

The hyperfast devices will serve as output and PFC rectifiers for DC/DC and AC/DC power stages, respectively, in automotive and industrial applications, and are optimized for the high speed output rectification function in resonant converters (LLC) for EV / HEV on-board battery chargers, DC fast off-board charging stations for EVs and HEVs, solar inverters, and UPS. To provide increased safety against high voltages in these applications, the rectifiers' D²PAK 2L package is designed to maximize the creepage distance between the anode and cathode by removing the central pin. The result is a creepage distance that is approximately six times higher than the D²PAK (TO-263AB).

Key Advantages

- AEC-Q101 and industrial qualified
- Maximized creepage distance for improved safety
- Optimized for high speed operation
- Best in class forward voltage drop and switching losses trade-off
- Hyperfast and optimized Q_{rr} (1200 V devices)
- Perfectly matched to operate with MOSFETs or high speed IGBTs (1200 V devices)
- Available in 15 A, 20 A, and 30 A current ratings to accommodate a wide range of power ratings
- Available in "H" and "X" speed classes for different operating frequencies
- High temperature operation to +175 °C
- Polyimide passivation
- Meet MSL level 1, per J-STD-020, LF maximum peak of 245 °C



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Key Specifications

AEC-Q101 qualified parts	V_{RRM} (V)	I_{F(AV)} (A)	V_F at I_F (V)	I_{FSM} (A)	t_{rr} (ns)	Q_{rr} (nC)
VS-E5TH1506S2LHM3	600	15	1.15	200	22	255
VS-E5TX1506S2LHM3	600	15	1.3	185	19	180
VS-E5TH2106S2LHM3	600	20	1.23	200	22	290
VS-E5TX2106S2LHM3	600	20	1.4	185	19	185
VS-E5TH3006S2LHM3	600	30	1.15	330	25	419
VS-E5TX3006S2LHM3	600	30	1.3	310	22	253
VS-E5TH1512S2LHM3	1200	15	1.7	125	37	545
VS-E5TX1512S2LHM3	1200	15	2.1	110	29	545
VS-E5TH2112S2LHM3	1200	20	1.88	125	37	670
VS-E5TX2112S2LHM3	1200	20	2.4	110	29	430
VS-E5TH3012S2LHM3	1200	30	1.7	240	32	850
VS-E5TX3012S2LHM3	1200	30	2.1	190	26	530
Industrial qualified parts	V_{RRM} (V)	I_{F(AV)} (A)	V_F at I_F (V)	I_{FSM} (A)	t_{rr} (ns)	Q_{rr} (nC)
VS-E5TH1506S2L-M3	600 V	15	1.15	200	22	255
VS-E5TX1506S2L-M3	600 V	15	1.3	185	19	180
VS-E5TH2106S2L-M3	600 V	20	1.23	200	22	290
VS-E5TX2106S2L-M3	600 V	20	1.4	185	19	185
VS-E5TH3006S2L-M3	600 V	30	1.15	330	25	419
VS-E5TX3006S2L-M3	600 V	30	1.3	310	22	253
VS-E5TH1512S2L-M3	1200 V	15	1.7	125	37	545
VS-E5TX1512S2L-M3	1200 V	15	2.1	110	29	545
VS-E5TH2112S2L-M3	1200 V	20	1.88	125	37	670
VS-E5TX2112S2L-M3	1200 V	20	2.4	110	29	430
VS-E5TH3012S2L-M3	1200 V	30	1.7	240	32	850
VS-E5TX3012S2L-M3	1200 V	30	2.1	190	26	530

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