



Product brief

650 V TRENCHSTOP™ 5 IGBT in TO-263-3 (D²PAK)

Unique highest power density 650 V IGBT for surface mounting

Highest power density in D²PAK footprint

Ultra-thin TRENCHSTOP™ 5 IGBT technology from Infineon allows higher power density in a smaller chip size. Infineon is the first on the market able to fit a 40 A 650 V IGBT with 40 A diode in D²PAK package – 25% higher than any other competitor offering maximum 30 A DuoPack IGBT in D²PAK. Now the upgrade of the available SMD designs for higher power output P_{out} is possible.

Possible use of the highest power density IGBT in D²PAK package

- > Upgrade of available D²PAK designs for up 25–30% higher power output
- > Reduce IGBT paralleling
- > 40 A DuoPack in D²PAK can be considered as alternative to D³PAK or TO-247 used for surface mounting

Lower stray inductance

Low inductance of the D²PAK package (5 nH) allows to fully utilize the advantages of ultra-fast TRENCHSTOP™ 5 IGBT technology – IGBT can be operated at higher switching frequency, with lower switching losses and reduced EMI emissions. Additionally lower stray inductance benefits to lower turn-off peak voltage, consequently – lower stress on the IGBT, increased reliability and longer lifetime expectancy.

Key features

- > Highest power density 650 V IGBT in D²PAK
- > Unique 40 A 650 V IGBT with 40 A diode in D²PAK footprint
- > 25% higher current in D²PAK than any other competitor

Key benefits

- > Higher power design with D²PAK package
- > Upgrade of the available designs for higher power output
- > Less paralleling for improved system reliability and less complexity
- > Smaller PCB, more compact system design, smaller weight

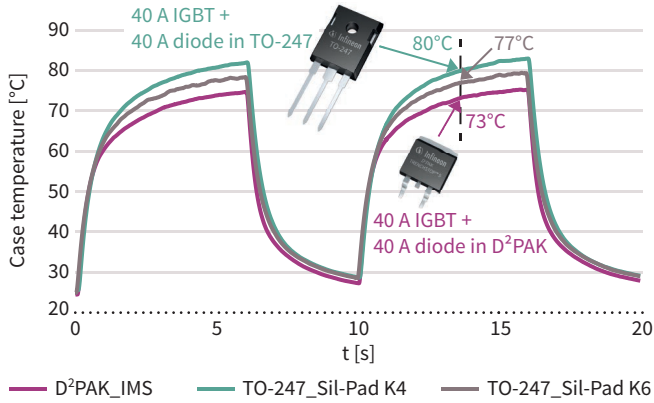
Market offering – 650 V IGBT in TO-263-3 (D²PAK)

IGBT manufacturer	Competitor 1	Competitor 2	Infineon S5	Competitor 1	Competitor 2	Infineon H5
Switching frequency	10–40 kHz			30–60 kHz		
600/650 V IGBT + diode	10 A	•				
	15 A	•				IKB15N65EH5
	20 A	•		•	•	IKB20N65EH5
	30 A		•	IKB30N65ES5	•	IKB30N65EH5
	40 A			IKB40N65ES5 ¹⁾		IKB40N65EH5 ¹⁾

1) Unique 40 A IGBT + 40 A diode in D²PAK

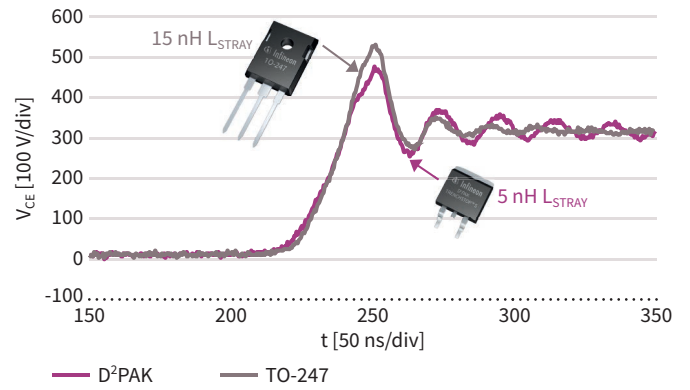


Thermal cycling test TRENCHSTOP™ 5 D²PAK on IMS performs with lower T_{case} temperature



Test conditions: $f_{sw} = 35 \text{ kHz}$; $P_{out} = 160 \text{ A DC}/24 \text{ V DC}$; same turn-off dv/dt ; $R_G = 22 \Omega$, $V_{in} = 230 \text{ V}_{RMS}$

TRENCHSTOP™ 5 D²PAK smaller stray inductance results in lower V_{CE,PEAK}



Test conditions: $R_G = 22 \Omega$; $P_{out} = 160 \text{ A DC}/24 \text{ V DC}$; $V_{in} = 230 \text{ V}_{RMS}$

Low inductance of the D²PAK package brings significant reduction of the switching losses, when comparing efficiency of the same chip in different package types – D²PAK and TO-247-3. Thermal cycling test on half-bridge welding machine compared performance of 40 A 650 V TRENCHSTOP™ 5 H5 IGBT co-packed with 40 A 650 V Rapid 1 diode in D²PAK and TO-247-3 packages and showed ~5...10°C lower case temperature T_{case} on D²PAK, proving that a small D²PAK mounted on IMS (insulated metal substrate) can be an effective replacement to TO-247 with isolation foil.

Product portfolio 650 V TRENCHSTOP™ 5 IGBT in TO-263-3 (D²PAK)

Part number	Switching frequency [kHz]	V _{br} [V]	I _c @ 100°C	V _{CE(sat)} @ 25°C	E _{ON} @ 25°C [mJ]	E _{OFF} @ 25°C [mJ]	Q _G [nC]	I _F @ 100°C [A]	Q _{rr} [μC]
		V _{GE} = 0 V, I _c = I _{nom}	[A]	[V]	V _{cc} = 400 V, I _c = I _{nom} , V _{GE} = 0/15 V, R _{G(on/off)} = 13 Ω, L _σ = 30 nH, C _σ = 30 pF L _σ , C _σ from fig.E				
Single IGBT									
IGB15N65S5	10–40	650	23.0	1.35	0.25	0.14	38	–	–
IGB20N65S5	10–40	650	28.0	1.35	0.36	0.15	48	–	–
IGB50N65S5	10–40	650	63.0	1.35	1.23	0.74	120	–	–
IGB50N65H5	30–100	650	54.0	1.65	1.59	0.75	120	–	–
DuoPack: IGBT + diode									
IKB30N65ES5	10–40	650	39.5	1.35	0.56	0.32	70	39.5	0.83
IKB40N65ES5	10–40	650	50.0	1.35	0.86	0.40	95	50.0	1.10
IKB15N65EH5	30–100	650	18.0	1.65	0.40	0.08	38	21.0	0.50
IKB20N65EH5	30–100	650	25.0	1.65	0.56	0.13	48	27.0	0.50
IKB30N65EH5	30–100	650	35.0	1.65	0.87	0.30	70	39.5	0.70
IKB40N65EH5	30–100	650	46.0	1.65	1.10	0.40	95	46.0	1.00
IKB40N65EF5	70–120	650	46.0	1.60	1.13	0.48	95	46.0	0.89

Learn more www.infineon.com/trenchstop5/d2pak

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