

September 2013

FGD4536 360 V PDP Trench IGBT

Features

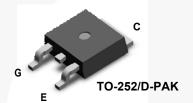
- · High Current Capability
- Low Saturation Voltage: $V_{CE(sat)} = 1.59 V @ I_C = 50 A$
- · High Input Impedance
- · Fast Switching
- RoHS Compliant

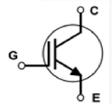
Applications

• PDP TV, Consumer Appliances

General Description

Using novel trench IGBT technology, Fairchild's new series of trench IGBTs offer the optimum performance for consumer appliances and PDP TV applications where low conduction and switching losses are essential.





Absolute Maximum Ratings

Symbol	Description		Ratings	Unit
V _{CES}	Collector to Emitter Voltage		360	V
V _{GES}	Gate to Emitter Voltage		± 30	V
I _{C pulse(1)*}	Pulsed Collector Current	@ T _C = 25°C	220	А
P _D	Maximum Power Dissipation	@ T _C = 25°C	125	W
	Maximum Power Dissipation	@ T _C = 100°C	50	W
TJ	Operating Junction Temperature		-55 to +150	°C
T _{stg}	Storage Temperature Range		-55 to +150	°C
T _L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds		300	°C

Thermal Characteristics

Symbol	Parameter	Тур.	Max.	Unit
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case	_	1.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	62.5	°C/W

Notes

(1) Half Sine Wave, D < 0.01, pluse width < 1μ sec

^{*} Ic_pluse limited by max Tj

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGD4536	FGD4536TM	TO252(D-PAK)	380 mm	16 mm	-
FGD4536	FGD4536TM_F065	TO252(D-PAK)	380 mm	16 mm	-

Electrical Characteristics of the IGBT $T_C = 25^{\circ}C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Off Charac	teristics					
BV _{CES}	Collector to Emitter Breakdown Voltage	$V_{GE} = 0V, I_{C} = 250 \mu A$	360	-	-	V
$\frac{\Delta BV_{CES}}{\Delta T_{J}}$	Temperature Coefficient of Breakdown Voltage	V _{GE} = 0V, I _C = 250 μA	-	0.4	-	V/°C
I _{CES}	Collector Cut-Off Current	V _{CE} = V _{CES} , V _{GE} = 0 V	-	-	100	μА
I _{GES}	G-E Leakage Current	$V_{GE} = V_{GES}$, $V_{CE} = 0 V$	/-	-	±400	nA
On Charac	teristics					
V _{GE(th)}	G-E Threshold Voltage	I _C = 250 μA, V _{CE} = V _{GE}	2.4	3.3	4.0	V
- (- /		I _C = 20 A, V _{GE} = 15 V	-	1.19	-	V
Vo=: ::	Collector to Emitter	I _C = 30 A, V _{GE} = 15 V	-	1.33	-	V
V _{CE(sat)} Collector to Emitter Saturation Voltage		I _C = 50 A, V _{GE} = 15 V, T _C = 25°C	-	1.59	1.8	V
		I _C = 50 A, V _{GE} = 15 V, T _C = 125°C	-	1.66	-	V
Dynamic C	haracteristics		1		'	
C _{ies}	Input Capacitance		-	1295	-	pF
C _{oes}	Output Capacitance	V _{CE} = 30 V _, V _{GE} = 0 V, f = 1 MHz	-	56	-	pF
C _{res}	Reverse Transfer Capacitance	1 - 1 WITZ	-	43	-	pF
Switching	Characteristics					
t _{d(on)}	Turn-On Delay Time		-	5	-	ns
t _r	Rise Time	$V_{CC} = 200 \text{ V}, I_C = 20 \text{ A},$	- 7	20	-	ns
t _{d(off)}	Turn-Off Delay Time	$R_G = 5 \Omega$, $V_{GE} = 15 V$, ResistiveLoad, $T_C = 25^{\circ}C$	-/	41	-	ns
t _f	Fall Time		-	182	- /	ns
t _{d(on)}	Turn-On Delay Time		-	5	-	ns
t _r	Rise Time	$V_{CC} = 200 \text{ V}, I_{C} = 20 \text{ A},$ $R_{G} = 5 \Omega, V_{GE} = 15 \text{ V},$	-	21		ns
t _{d(off)}	Turn-Off Delay Time	Resistive Load, $T_C = 125^{\circ}C$	-	43	-	ns
t _f	Fall Time		-	249	- /	ns
Qg	Total Gate Charge	\/ = 200 \/	-	47	- /	nC
Q _{ge}	Gate to Emitter Charge	$V_{CE} = 200 \text{ V}, I_{C} = 20 \text{ A},$ $V_{GE} = 15 \text{ V}$	- , , ,	5.4	-	nC
Q _{gc}	Gate to Collector Charge		-	15	-	nC

Figure 1. Typical Output Characteristics

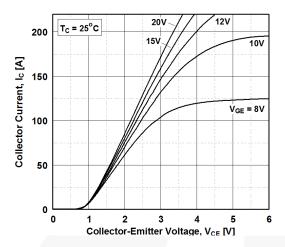


Figure 3. Typical Saturation Voltage Characteristics

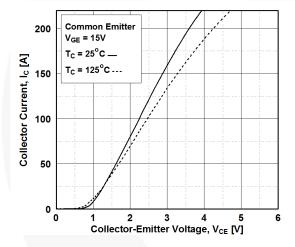


Figure 5. Saturation Voltage vs. V_{GE}

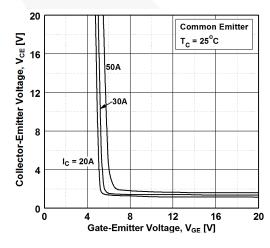


Figure 2. Typical Output Characteristics

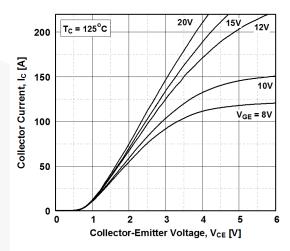


Figure 4. Transfer Characteristics

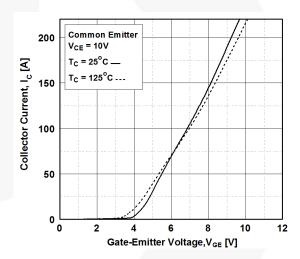


Figure 6. Saturation Voltage vs. V_{GE}

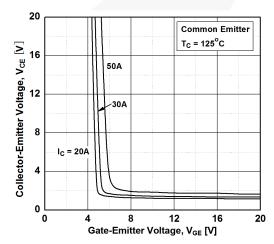


Figure 7. Saturation Voltage vs. Case
Temperature at Variant Current Level

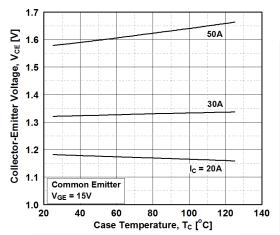


Figure 8. Capacitance Characteristics

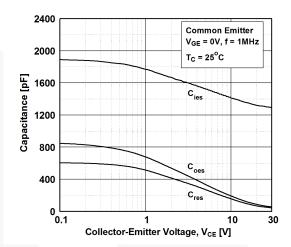


Figure 9. Gate charge Characteristics

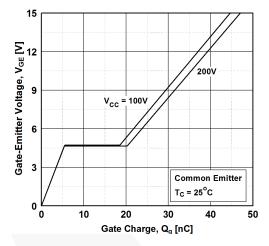
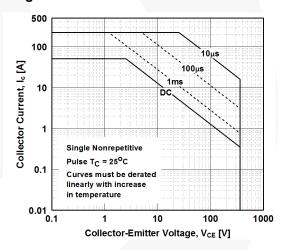


Figure 10. SOA Characteristics



Fgure 11. Turn-on Characteristics vs.
Gate Resistance

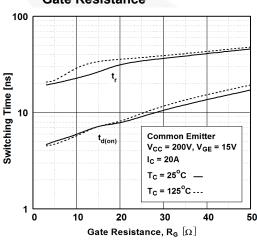


Figure 12. Turn-off Characteristics vs.
Gate Resistance

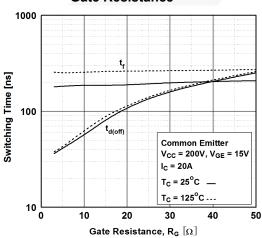


Figure 13. Turn-on Characteristics vs. Collector Current

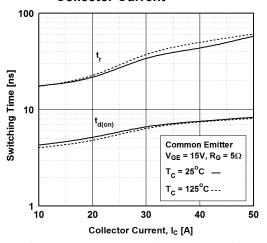


Figure 14. Turn-off Characteristics vs. Collector Current

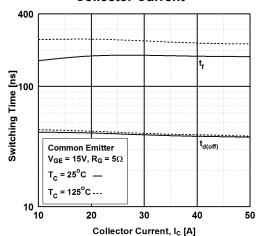


Figure 15. Switching Loss vs. Gate Resistance

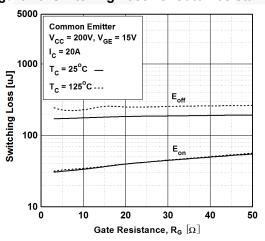


Figure 16. Switching Loss vs. Collector Current

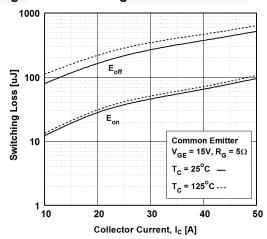


Figure 17. Turn off Switching SOA Characteristics

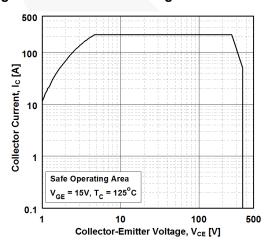
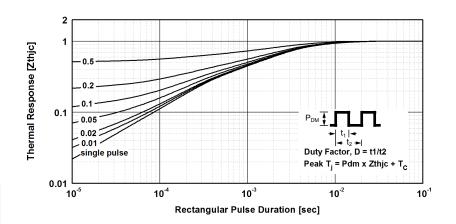


Figure 18.Transient Thermal Impedance of IGBT



Mechanical Dimensions 6.00 MIN-6.50 MIN 1.02 MAX C 3.00 MIN (0.59)1.40 MIN 2.30 2.29 0.25(M) A(M) C 4.60 4.57 LAND PATTERN RECOMMENDATION SEE NOTE D 4.32 MIN MIN 5.21 SEE 10.41 9.40 DETAIL A ○ 0.10 B 0.51 GAGE PLANE NOTES: UNLESS OTHERWISE SPECIFIED A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE C, VARIATION AA. B) ALL DIMENSIONS ARE IN MILLIMETERS. ALL DIMENSIONS ARE IN MILLIMETERS. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994. HEAT SINK TOP EDGE COULD BE IN CHAMFERED CORNERS OR EDGE PROTRUSION. PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL E) 1.78 1.40 0.127 MAX IS OPTIONAL. DIMENSIONS ARE EXCLUSSIVE OF BURSS, MOLD FLASH AND TIE BAR EXTRUSIONS. LAND PATTERN RECOMENDATION IS BASED ON IPC7351A STD T0220P1003X238-3N. F) SEATING PLANE (2.90)G)

Figure 19. TO252 (D-PAK), MOLDED, 3 LEAD, OPTION AA&AB

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DRAWING NUMBER AND REVISION: MKT-T0252A03REV8

Dimensions in Millimeters

DETAIL A (ROTATED -90°) SCALE: 12X





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