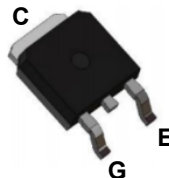
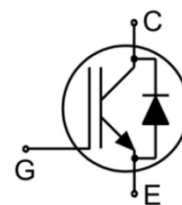


**Main Product Characteristics:**

$V_{CES}$	650V
$I_C$	6A
$V_{CE(sat)}$	1.69V



TO - 252



Schematic Diagram

**Features and Benefits:**

- Trench epi-Fs Technology
- High speed switching
- Low gate charge and  $V_{CE(sat)}$
- High ruggedness, temperature stable behavior
- Maximum junction temperature 150°C


**Applications:**

- Home Appliance Applications
- Fan, Pumps, Vacuum Cleaner
- Motor drives
- Other Hard Switching Applications

**Absolute Max Rating:**

Symbol	Parameter	Value	Units
$V_{CES}$	Collector-Emitter Voltage	650	V
$V_{GES}$	Gate- Emitter Voltage	$\pm 30$	V
$I_C$	Collector Current	12	A
	Collector Current @ $T_C = 100\text{ }^\circ\text{C}$	6	
	Pulsed Collector Current, $t_p$ limited by $T_{Jmax}$	35	
-	Turn off safe operating area, $V_{CE}=650\text{V}$ , $T_J=175\text{ }^\circ\text{C}$	35	
$I_F$	Diode Continuous Forward Current @ $T_C = 25\text{ }^\circ\text{C}$	12	A
	Diode Continuous Forward Current @ $T_C = 100\text{ }^\circ\text{C}$	6	
	Diode Maximum Forward Current	35	
$P_D$	Power Dissipation @ $T_C = 25\text{ }^\circ\text{C}$	69	W
	Power Dissipation @ $T_C = 100\text{ }^\circ\text{C}$	28	
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
$T_L$	Maximum Temperature for Soldering	300	$^\circ\text{C}$

**Thermal Resistance**

Symbol	Characterizes	Typ.	Max.	Units
R <sub>θJC</sub>	Thermal Resistance, Junction-to-case for IGBT	—	1.8	°C/W
	Thermal Resistance, Junction-to-case for Diode	—	2.2	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-ambient	—	40	°C/W

**Electrical Characteristics @T<sub>A</sub>=25°C unless otherwise specified**

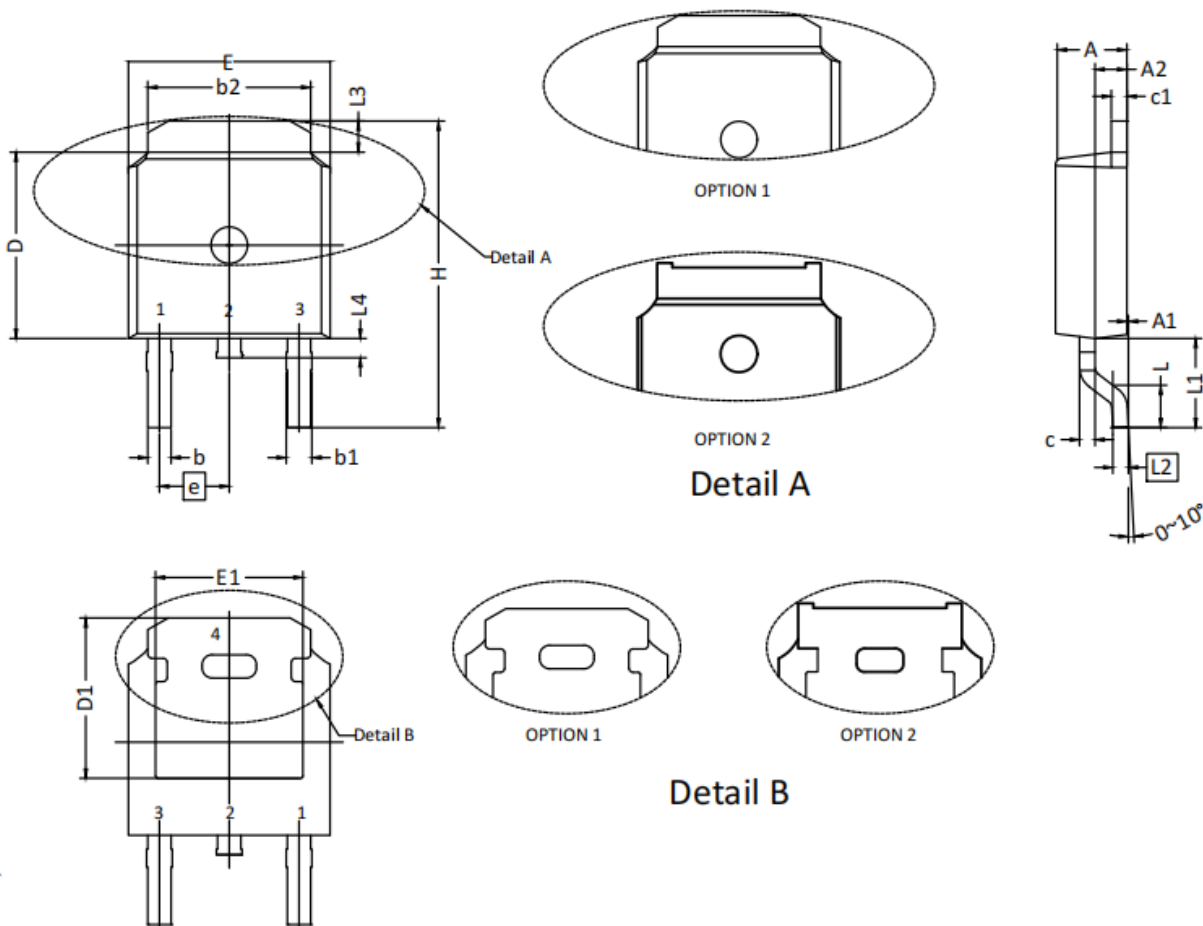
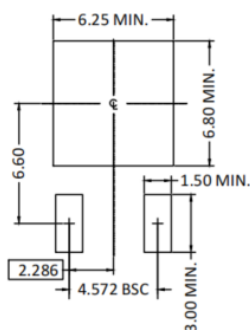
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)CES</sub>	Collector-Emitter Breakdown Voltage	650	—	—	V	V <sub>GE</sub> =0V, I <sub>CE</sub> =1mA
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	—	1.69	2.0	V	I <sub>C</sub> =6A, V <sub>GE</sub> =15V @ T <sub>J</sub> =25°C
V <sub>GE(th)</sub>	Gate Threshold Voltage	4.5	—	6.5	V	I <sub>C</sub> =1mA, V <sub>CE</sub> =5V
I <sub>CES</sub>	Collector-Emitter Leakage Current	—	—	10	μA	V <sub>GE</sub> =0V, V <sub>CE</sub> =650V
I <sub>GES</sub>	Gate to Emitter Reverse Leakage	—	—	100	nA	V <sub>GE</sub> =30V, V <sub>CE</sub> =0V
		—	—	-100		V <sub>GE</sub> =-30V, V <sub>CE</sub> =0V
C <sub>ies</sub>	Input capacitance	—	258	—	pF	V <sub>GS</sub> = 0V
C <sub>oes</sub>	Output capacitance	—	18	—		V <sub>DS</sub> = 25V
C <sub>res</sub>	Reverse transfer capacitance	—	5	—		f = 1MHz
t <sub>d(on)</sub>	Turn-on delay time	—	5	—	ns	V <sub>CC</sub> =400V, I <sub>C</sub> =6A, V <sub>GE</sub> =0/15V, R <sub>g</sub> =10Ω,
t <sub>r</sub>	Rise time	—	13	—		
t <sub>d(off)</sub>	Turn-Off delay time	—	53	—		
t <sub>f</sub>	Fall time	—	90	—		
E <sub>on</sub>	Turn-On Switching Loss	—	0.19	—	mJ	V <sub>CC</sub> =400V, I <sub>C</sub> =6A, V <sub>GE</sub> =0/15V, R <sub>g</sub> =10Ω,
E <sub>off</sub>	Turn-Off Switching Loss	—	0.11	—		
E <sub>ts</sub>	Total Switching Loss	—	0.3	—		
Q <sub>g</sub>	Total Gate Charge	—	10	—	nC	V <sub>CC</sub> =520V, I <sub>C</sub> =6A, V <sub>GE</sub> =15V
Q <sub>ge</sub>	Gate to Emitter Charge	—	3	—		
Q <sub>gc</sub>	Gate to Collector Charge	—	4	—		
I <sub>C(SC)</sub>	Short circuit collector current Max.1000 short circuits Time between short circuits: ≥1.0s	—	30	—	A	V <sub>GE</sub> =15V, V <sub>CC</sub> ≤400V, t <sub>sc</sub> ≤5μs

**Electrical Characteristics of the Diode @T<sub>A</sub>=25°C unless otherwise specified**

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>FM</sub>	Diode Forward Voltage	—	1.92	2.3	V	I <sub>F</sub> =6A
t <sub>rr</sub>	Reverse Recovery Time	—	70	—	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> =6A, V <sub>R</sub> =400V V <sub>GE</sub> =0.0/15.0V
Q <sub>rr</sub>	Reverse Recovery Charge	—	0.32	—	μC	
I <sub>RRM</sub>	Diode Peak Reverse Recovery Current	—	8	—	A	

**Mechanical Data:**

Unit:mm


**RECOMMENDED LAND PATTERN**


SYMBOLS	DIMENSION IN MM			DIMENSION IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	2.184	2.286	2.400	0.086	0.090	0.094
A1	0.000	---	0.200	0.000	---	0.008
A2	0.889	1.041	1.170	0.035	0.041	0.046
b	0.635	0.762	0.889	0.025	0.030	0.035
b1	0.680	0.840	1.143	0.027	0.033	0.045
b2	4.953	5.340	5.500	0.195	0.210	0.217
c	0.450	0.508	0.610	0.018	0.020	0.024
c1	0.450	0.508	0.630	0.018	0.020	0.025
D	5.969	6.096	6.223	0.235	0.240	0.245
D1	5.210	5.249	5.380	0.205	0.207	0.212
E	6.350	6.604	6.800	0.250	0.260	0.268
E1	4.318	4.826	4.920	0.170	0.190	0.194
e	2.286 BSC			0.090 BSC		
e1	4.572 BSC			0.180 BSC		
H	9.398	10.033	10.500	0.370	0.395	0.413
L	1.270	1.520	2.032	0.050	0.060	0.080
L1	2.921 REF.			0.115 REF.		
L2	0.408	0.508	0.608	0.016	0.020	0.024
L3	0.889	1.016	1.270	0.035	0.040	0.050
L4	0.600	---	1.016	0.024	---	0.040

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