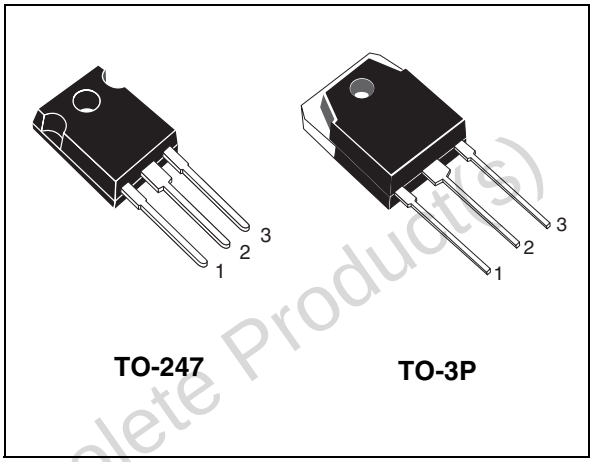
STGW38IH130D, STGWT38IH130D

33 A - 1300 V - very fast IGBT

Datasheet – production data

Features

- Low saturation voltage
- High current capability
- Low switching loss
- Low static and peak forward voltage drop free-wheeling diode



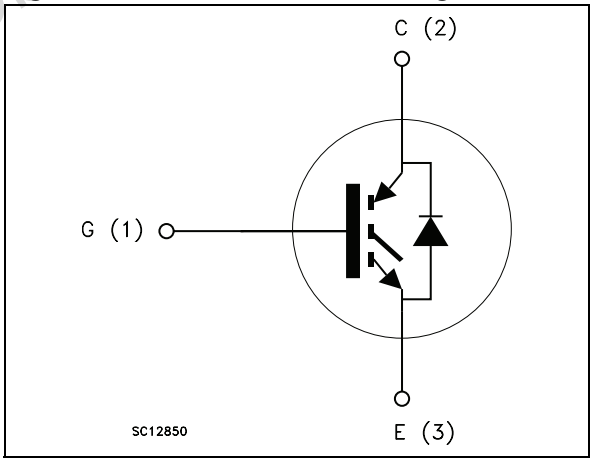
Applications

- Induction cooking, microwave ovens
- Soft-switching applications

Description

This device is a very fast IGBT developed using advanced PowerMESH™ technology. This process guarantees an excellent trade-off between switching performance and low on-state behavior. This device is well-suited for resonant or soft-switching applications.

Figure 1. Internal schematic diagram



Obsolete Product(s) - Obsolete Product(s)

Table 1. Device summary

Order codes	Marking	Package	Packaging
STGW38IH130D	GW38IH130D	TO-247 long leads	Tube
STGWS38IH130D		TO-247	
STGWT38IH130D		TO-3P	

This is information on a product in full production. www.st.com

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2.1 Electrical characteristics (curves) 6

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Obsolete Product(s) - Obsolete Product(s)

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		TO-3P, TO-247 long leads	TO-247	
V_{CES}	Collector-emitter voltage (V_{GE} = 0)	1300		V
I_C (1)	Continuous collector current at T_C = 25 °C	63	55	A
I_C (1)	Continuous collector current at T_C = 100 °C	33	25	A
I_{CL} (2)	Turn-off latching current	40		A
I_{CP} (3)	Pulsed collector current	125		A
V_{GE}	Gate-emitter voltage	±25		V
P_{TOT}	Total dissipation at T_C = 25 °C	250	180	W
I_F	Diode RMS forward current at T_C = 25 °C	30		A
I_{FSM}	Surge non repetitive forward current t_p = 10 ms sinusoidal	100		A
T_j	Operating junction temperature	–55 to 150		°C

1. Calculated according to the iterative formula:

$$I_C(T_C) = \frac{T_{j(max)} - T_C}{R_{thj-c} \times V_{CE(sat)(max)}(T_{j(max)}, I_C(T_C))}$$

2. V_{clamp} = 960 V, T_j =150 °C, R_G=10 Ω, V_{GE}=15 V
3. Pulse width limited by maximum permissible junction temperature and turn-off within RBSOA

Table 3. Thermal data

Symbol	Parameter	Value		Unit
		TO-3P, TO-247 long leads	TO-247	
$R_{thj\text{-}case}$	Thermal resistance junction-case IGBT	0.5	0.7	°C/W
$R_{thj\text{-}case}$	Thermal resistance junction-case diode	2	2.1	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient	50		°C/W

Obsolete Product(s) - Obsolete Product(s)

2 Electrical characteristics

T_J= 25 °C unless otherwise specified.

Table 4. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-emitter breakdown voltage (V_{GE} = 0)	I_C = 1 mA	1300			V
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_{GE}= 15 V, I_C= 20 A V_{GE}= 15 V, I_C= 20 A, T_J =125 °C		2.1 2.0	2.8	V V
$V_{GE(th)}$	Gate threshold voltage	V_{CE}= V_{GE}, I_C= 1 mA	3.75		5.75	V
I_{CES}	Collector-cut-off current (V_{GE} = 0)	V_{CE} =1300 V V_{CE} =1300 V, T_J=125 °C			1 10	mA mA
I_{GES}	Gate-emitter leakage current (V_{CE} = 0)	V_{GE} =± 20 V			± 100	nA
g_{fs} (1)	Forward transconductance	V_{CE} = 25 V, I_C= 20 A		20		S
V_F	Diode forward voltage	I_F = 20 A I_F = 20 A, T_J = 125 °C		 1.3	1.9 1.7	V V

1. Pulsed: pulse duration = 300 µs, duty cycle 1.5%

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{ies} C_{oes} C_{res}	Input capacitance Output capacitance Reverse transfer capacitance	V_{CE} = 25 V, f = 1 MHz, V_{GE}=0	-	2900 155 30	-	pF pF pF
Q_g Q_{ge} Q_{gc}	Total gate charge Gate-emitter charge Gate-collector charge	V_{CE} = 960 V, I_C= 20 A,V_{GE}=15 V	-	127 18 50	-	nC nC nC

Table 6. Inductive load switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_r(V_{off})$ $t_{d(off)}$ t_f	Off voltage rise time Turn-off delay time Current fall time	V_{CC} = 960 V, I_C = 20 A R_G= 10 Ω, V_{GE}= 15 V, *(see Figure 16)*	-	102 284 180	-	ns ns ns
$t_r(V_{off})$ $t_{d(off)}$ t_f	Off voltage rise time Turn-off delay time Current fall time	V_{CC} = 960 V, I_C = 20 A R_G= 10 Ω, V_{GE}= 15 V, T_J= 125 °C *(see Figure 16)*	-	200 424 316	-	ns ns ns

Obsolete Product(s) - Obsolete Product(s)

Table 7. Switching energy (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
E_{off} (1)	Turn-off switching losses	V_{CC} = 960 V, I_C = 20 A R_G= 10 Ω, V_{GE}= 15 V, *(see Figure 16)*	-	3.4	-	mJ
E_{off} (1)	Turn-off switching losses	V_{CC} = 960 V, I_C = 20 A R_G= 10 Ω, V_{GE}= 15 V, T_J= 125 °C *(see Figure 16)*	-	6.4	-	mJ

1. Turn-off losses include also the tail of the collector current

Obsolete Product(s) - Obsolete Product(s)

2.1 Electrical characteristics (curves)

Figure 2. Output characteristics

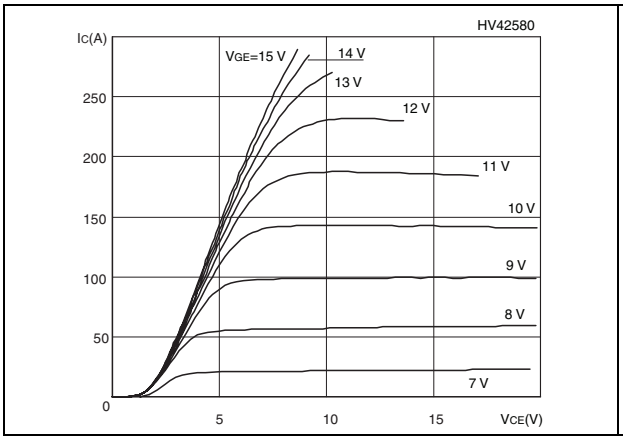


Figure 3. Transfer characteristics

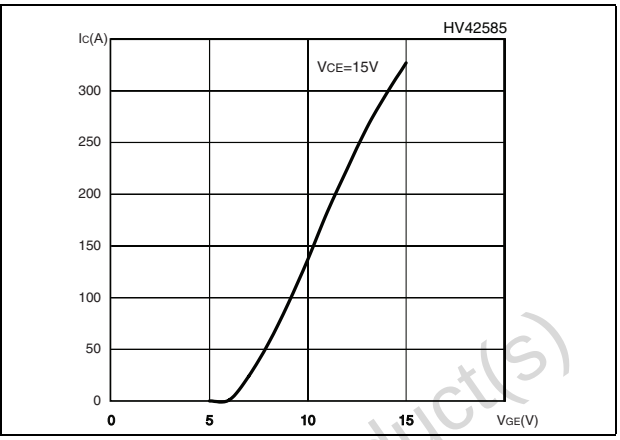


Figure 4. Transconductance

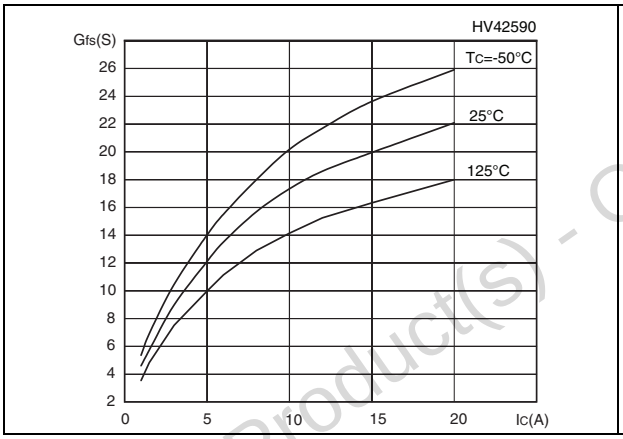


Figure 5. Collector-emitter on voltage vs. temperature

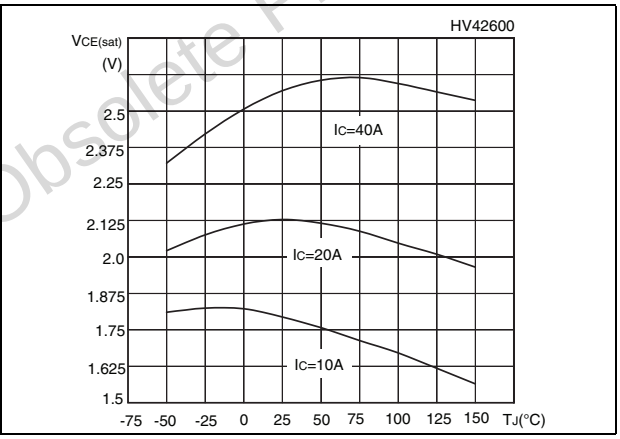


Figure 6. Normalized breakdown voltage vs. temperature

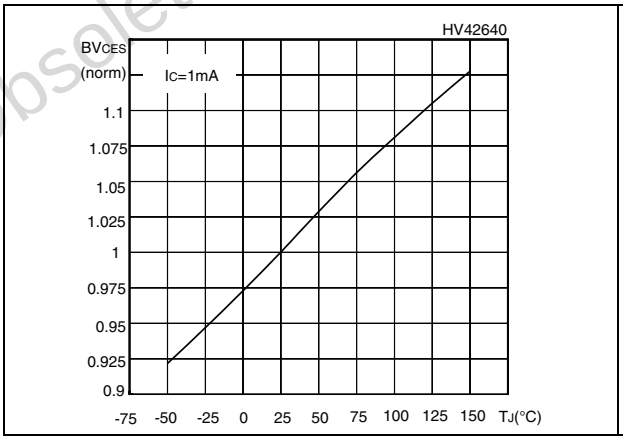
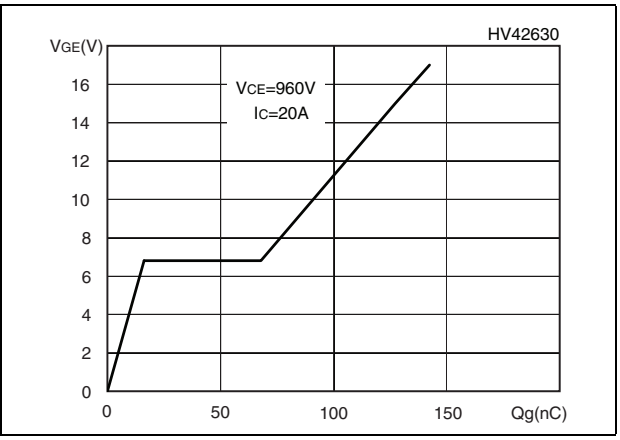


Figure 7. Gate-charge vs. gate-emitter



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Figure 8. Normalized gate threshold voltage vs. temperature

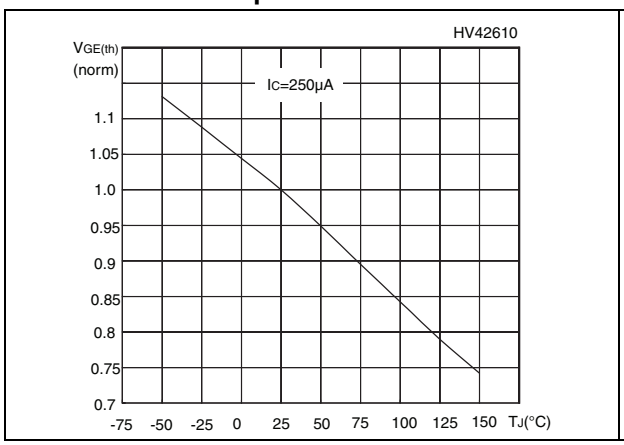


Figure 9. Collector-emitter on voltage vs. collector current

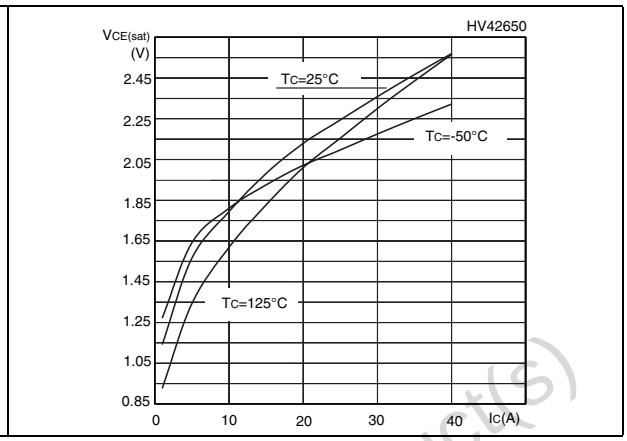


Figure 10. Switching losses vs. temperature

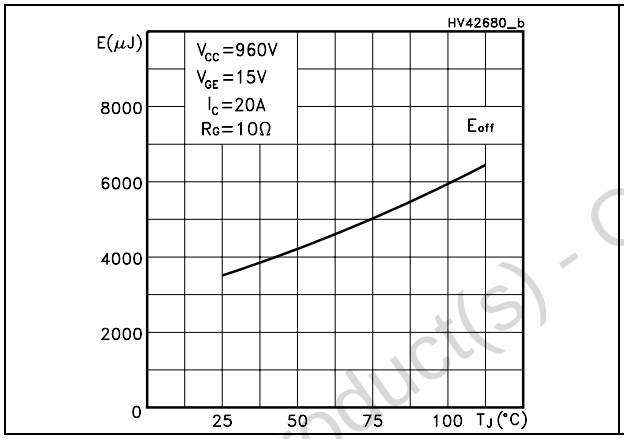


Figure 11. Switching losses vs. gate resistance

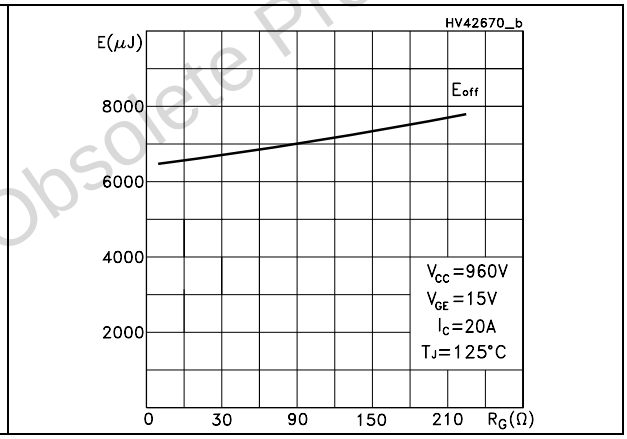


Figure 12. Switching losses vs. collector current

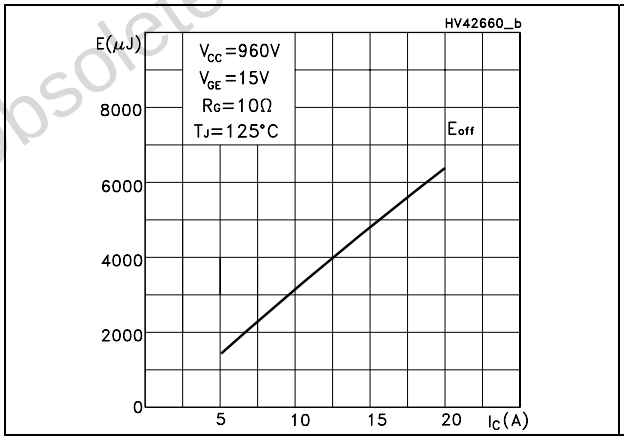
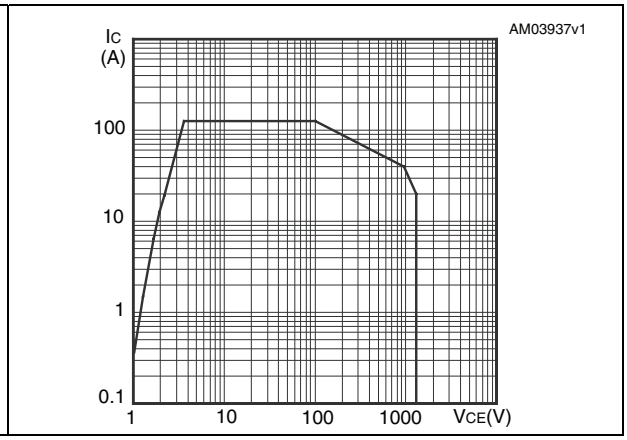


Figure 13. RBSOA



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Figure 14. Emitter-collector diode characteristics

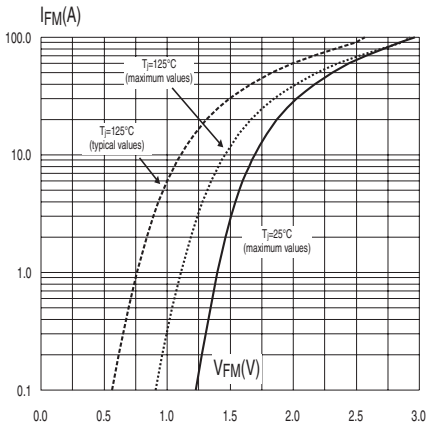
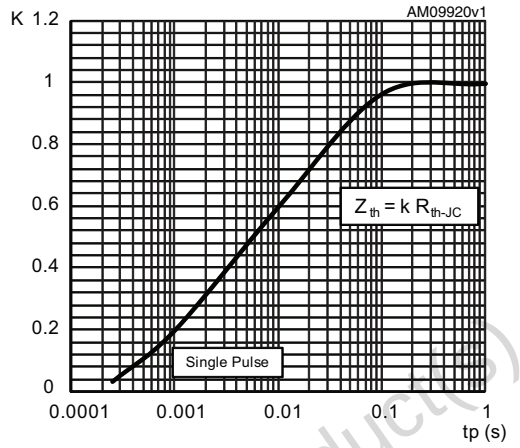


Figure 15. Thermal impedance



Obsolete Product(s) - Obsolete Product(s)

3 Test circuits

Figure 16. Test circuit for inductive load switching

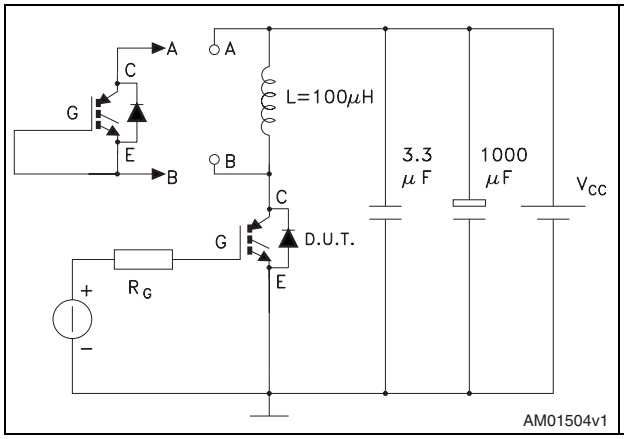


Figure 17. Gate charge test circuit

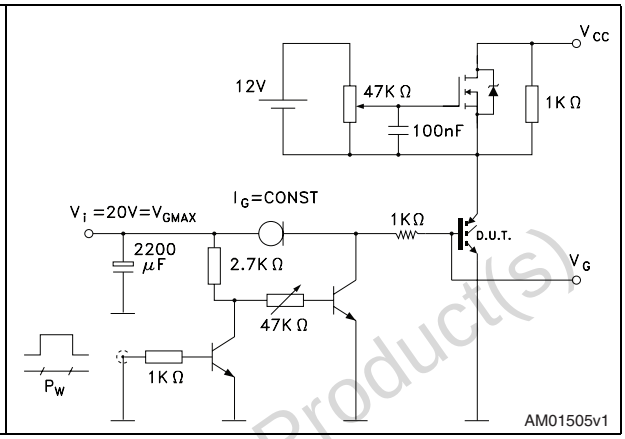
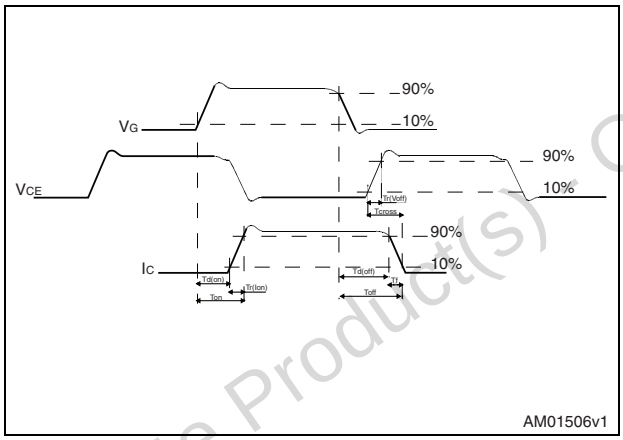


Figure 18. Switching waveform



Obsolete Product(s) Obsolete Product(s)

4 Package mechanical data

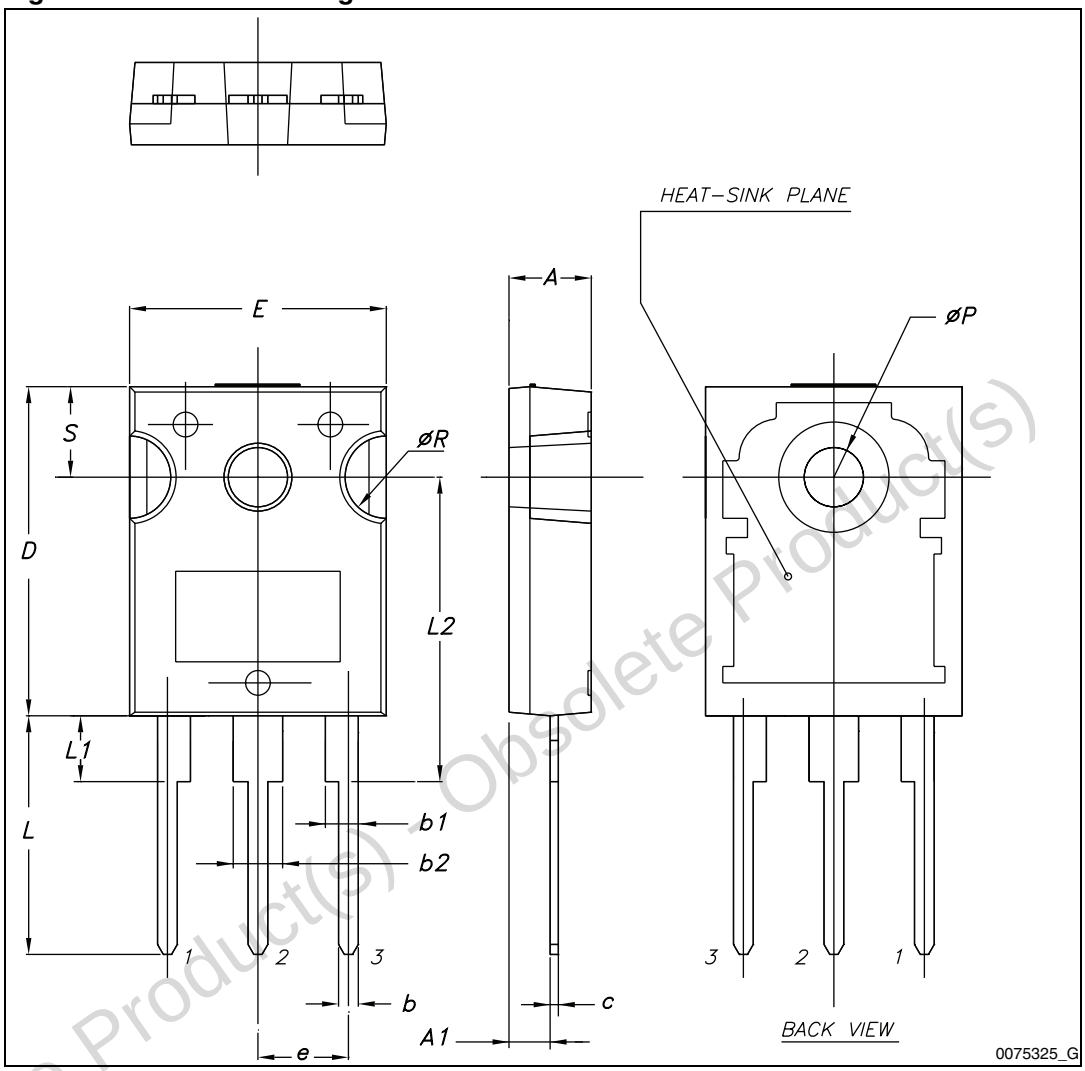
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Table 8. TO-247 mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A	4.85		5.15
A1	2.20		2.60
b	1.0		1.40
b1	2.0		2.40
b2	3.0		3.40
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e	5.30	5.45	5.60
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
∅P	3.55		3.65
∅R	4.50		5.50
S	5.30	5.50	5.70

Obsolete Product(s) - Obsolete Product(s)

Figure 19. TO-247 drawing



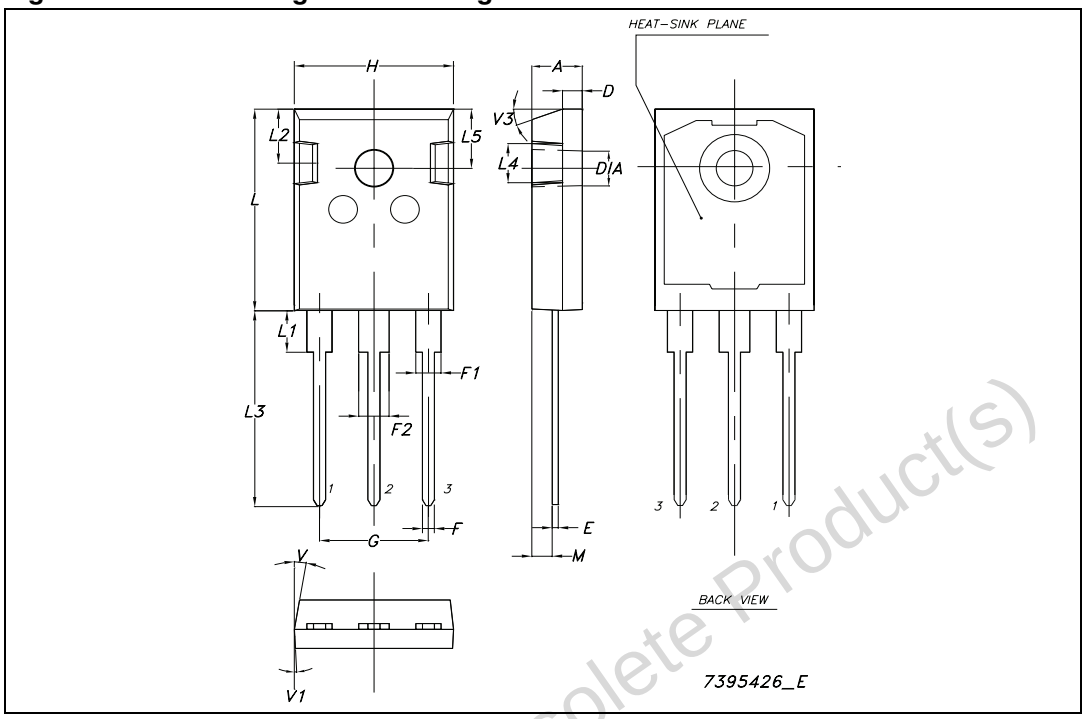
Obsolete Product(s) - Obsolete Product(s)

Table 9. TO-247 long leads mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.90		5.15
D	1.85		2.10
E	0.55		0.67
F	1.07		1.32
F1	1.90		2.38
F2	2.87		3.38
G		10.90 BSC	
H	15.77		16.02
L	20.82		21.07
L1	4.16		4.47
L2	5.49		5.74
L3	20.05		20.30
L4	3.68		3.93
L5	6.04		6.29
M	2.27		2.52
V		10°	
V1		3°	
V3		20°	
Dia.	3.55		3.66

Obsolete Product(s) - Obsolete Product(s)

Figure 20. TO-247 long leads drawing



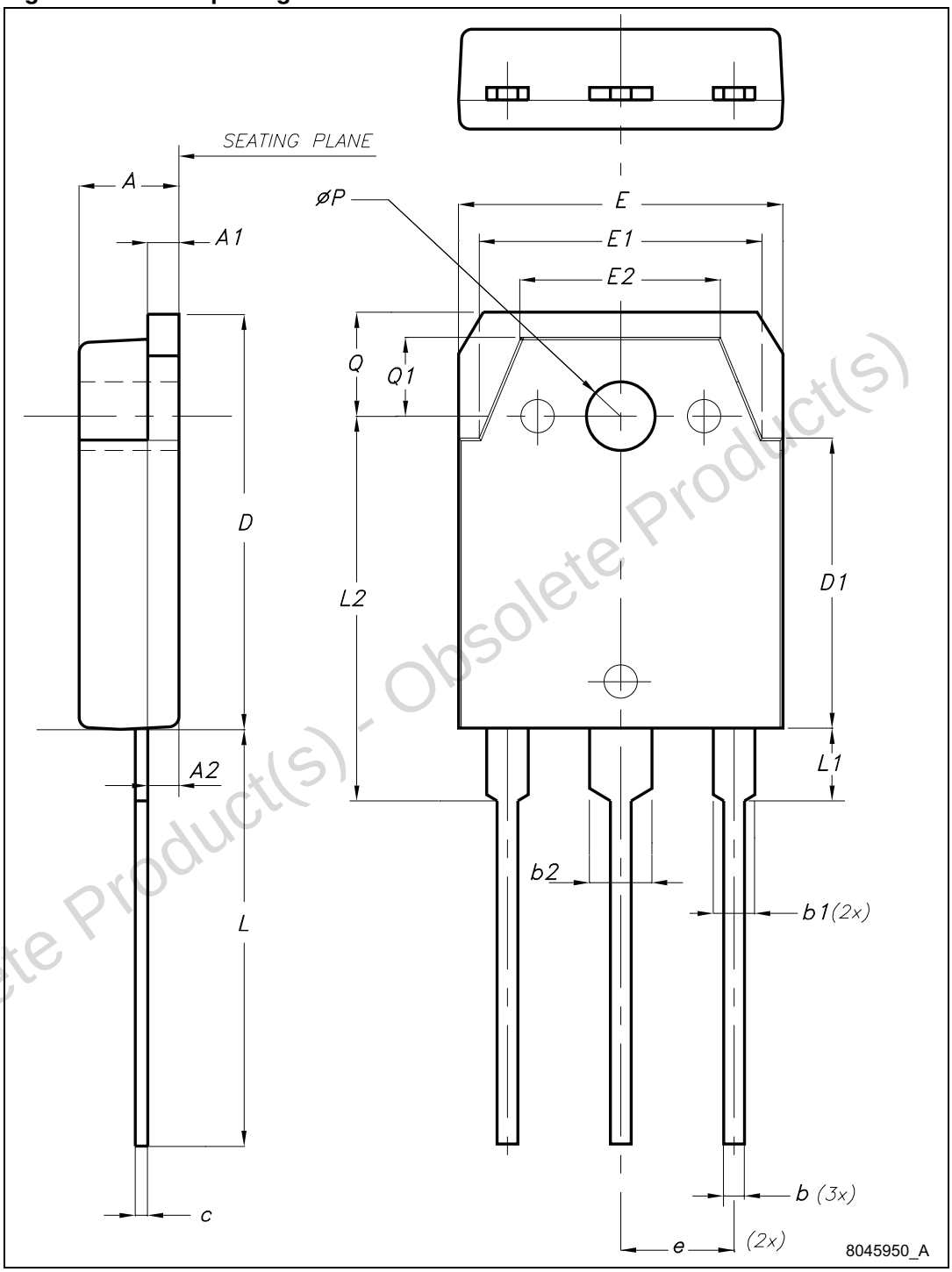
Obsolete Product(s) - Obsolete Product(s)

Table 10. TO-3P mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.60		5
A1	1.45	1.50	1.65
A2	1.20	1.40	1.60
b	0.80	1	1.20
b1	1.80		2.20
b2	2.80		3.20
c	0.55	0.60	0.75
D	19.70	19.90	20.10
D1		13.90	
E	15.40		15.80
E1		13.60	
E2		9.60	
e	5.15	5.45	5.75
L	19.50	20	20.50
L1		3.50	
L2	18.20	18.40	18.60
øP	3.10		3.30
Q		5	
Q1		3.80	

Obsolete Product(s) - Obsolete Product(s)

Figure 21. TO-3P package dimensions



Obsolete Product(s) - Obsolete Product(s)

5 Revision history

Table 11. Document revision history

Date	Revision	Changes
11-May-2009	1	Initial release
16-Jul-2009	2	Document status promoted from preliminary data to datasheet
05-Jul-2011	3	Added: *Figure 15 on page 8* and new package mechanical data *Table 10 on page 14*, *Figure 21 on page 15*.
04-Sep-2012	4	Updated: *Table 1 on page 1*, TO-247 mechanical data *Table 8 on page 10* and *Figure 19 on page 11*.

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