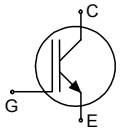
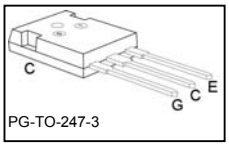
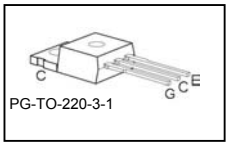
SGP10N60A
SGW10N60A

Fast IGBT in NPT-technology





PG-TO-247-3



PG-TO-220-3-1

- 75% lower E_{off} compared to previous generation
  combined with low conduction losses
- Short circuit withstand time – 10 µs
- Designed for:
  - Motor controls
  - Inverter
- NPT-Technology for 600V applications offers:
  - very tight parameter distribution
  - high ruggedness, temperature stable behaviour
  - parallel switching capability
- Qualified according to JEDEC[1] for target applications
- Pb-free lead plating; RoHS compliant
- Complete product spectrum and PSpice Models : http://www.infineon.com/igbt/

Type	V_{CE}	I_C	$V_{CE(sat)}$	T_j	Marking	Package
SGP10N60A	600V	10A	2.3V	150°C	G10N60A	PG-TO-220-3-1
SGW10N60A	600V	10A	2.3V	150°C	G10N60A	PG-TO-247-3

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	600	V
DC collector current T_C = 25°C T_C = 100°C	I_C	 20 10.6	A
Pulsed collector current, t_p limited by T_{jmax}	I_{Cpuls}	40	
Turn off safe operating area $V_{CE} \le 600V$, $T_j \le 150°C$	-	40	
Gate-emitter voltage	V_{GE}	±20	V
Avalanche energy, single pulse I_C = 10 A, V_{CC} = 50 V, R_{GE} = 25 Ω, start at T_j = 25°C	E_{AS}	70	mJ
Short circuit withstand time[2] V_{GE} = 15V, $V_{CC} \le 600V$, $T_j \le 150°C$	t_{SC}	10	µs
Power dissipation T_C = 25°C	P_{tot}	92	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C
Soldering temperature, wavesoldering, 1.6mm (0.063 in.) from case for 10s	T_s	260	

[1] J-STD-020 and JESD-022
[2] Allowed number of short circuits: <1000; time between short circuits: >1s.

Thermal Resistance

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
IGBT thermal resistance, junction – case	R_{thJC}		1.35	K/W
Thermal resistance, junction – ambient	R_{thJA}	PG-TO-220-3-1 PG-TO-247-3-21	62 40	

Electrical Characteristic, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	Typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE}=0V, I_C=500µA	600	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C=10A T_j=25°C T_j=150°C	 1.7 -	 2 2.3	 2.4 2.8	
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C=300µA, V_{CE}=V_{GE}	3	4	5	
Zero gate voltage collector current	I_{CES}	V_{CE}=600V, V_{GE}=0V T_j=25°C T_j=150°C	 - -	 - -	 40 1500	µA
Gate-emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V	-	-	100	nA
Transconductance	g_{fs}	V_{CE}=20V, I_C=10A	-	6.7	-	S
Dynamic Characteristic						
Input capacitance	C_{iss}	V_{CE}=25V,	-	550	660	pF
Output capacitance	C_{oss}	V_{GE}=0V,	-	62	75	
Reverse transfer capacitance	C_{rss}	f=1MHz	-	42	51	
Gate charge	Q_{Gate}	V_{CC}=480V, I_C=10A V_{GE}=15V	-	52	68	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E	PG-TO-220-3-1 PG-TO-247-3-21	- -	7 13	- -	nH
Short circuit collector current[2)]	$I_{C(SC)}$	V_{GE}=15V, t_{SC}≤10µs V_{CC} ≤ 600V, T_j ≤ 150°C	-	100	-	A

[2)] Allowed number of short circuits: <1000; time between short circuits: >1s.

Switching Characteristic, Inductive Load, at T_j=25 °C

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	T_j=25°C, V_{CC}=400V, I_C=10A, V_{GE}=0/15V, R_G=25Ω, L_σ [1)] =180nH, C_σ [1)] =55pF Energy losses include "tail" and diode reverse recovery.	-	28	34	ns
Rise time	t_r		-	12	15	
Turn-off delay time	$t_{d(off)}$		-	178	214	
Fall time	t_f		-	24	29	
Turn-on energy	E_{on}		-	0.15	0.173	mJ
Turn-off energy	E_{off}		-	0.17	0.221	
Total switching energy	E_{ts}		-	0.320	0.394	

Switching Characteristic, Inductive Load, at T_j=150 °C

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	T_j=150°C V_{CC}=400V, I_C=10A, V_{GE}=0/15V, R_G=25Ω L_σ [1)] =180nH, C_σ [1)] =55pF Energy losses include "tail" and diode reverse recovery.	-	28	34	ns
Rise time	t_r		-	12	15	
Turn-off delay time	$t_{d(off)}$		-	198	238	
Fall time	t_f		-	26	32	
Turn-on energy	E_{on}		-	0.260	0.299	mJ
Turn-off energy	E_{off}		-	0.280	0.364	
Total switching energy	E_{ts}		-	0.540	0.663	

[1)] Leakage inductance L_σ and Stray capacity C_σ due to dynamic test circuit in Figure E.

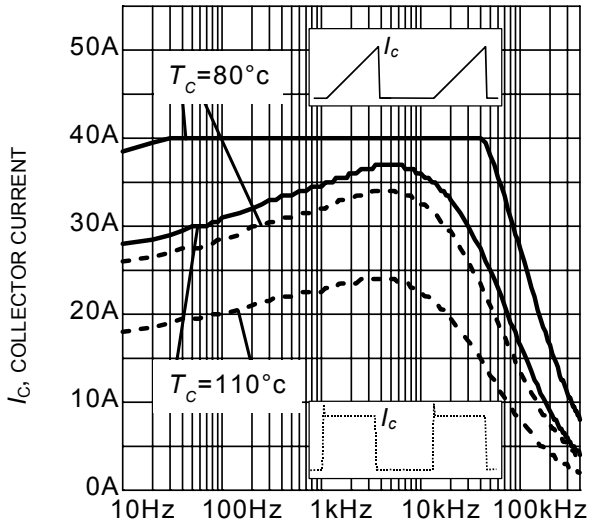


Figure 1. Collector current as a function of switching frequency
($T_j \le 150°C$, $D = 0.5$, $V_{CE} = 400V$, $V_{GE} = 0/+15V$, $R_G = 25\Omega$)

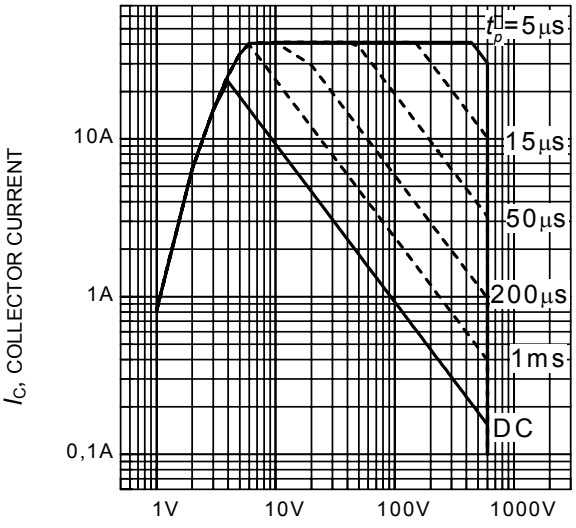


Figure 2. Safe operating area
($D = 0$, $T_C = 25°C$, $T_j \le 150°C$)

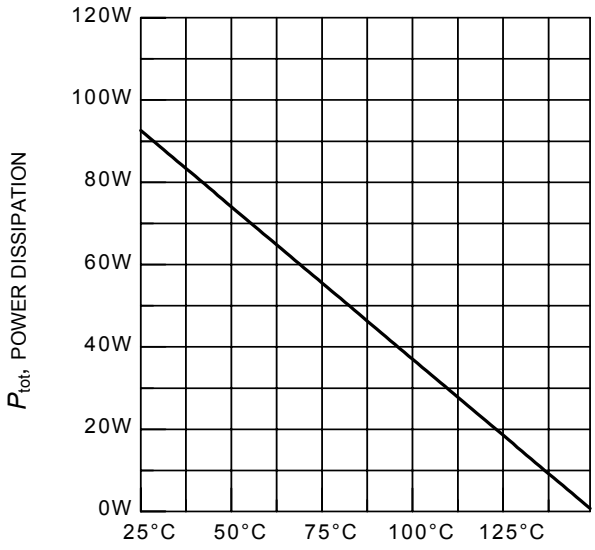


Figure 3. Power dissipation as a function of case temperature
($T_j \le 150°C$)

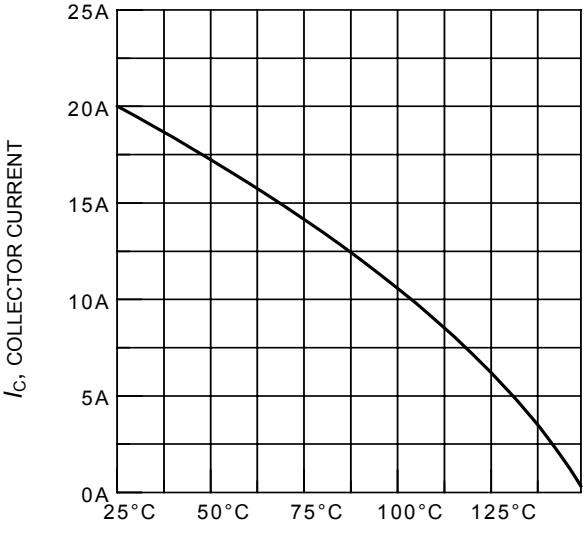


Figure 4. Collector current as a function of case temperature
($V_{GE} \le 15V$, $T_j \le 150°C$)

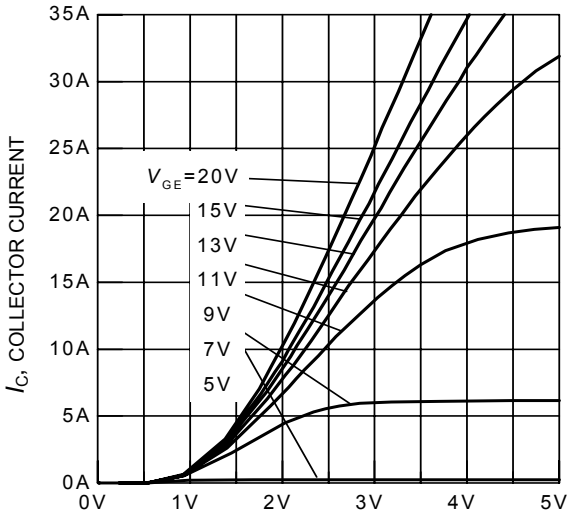


Figure 5. Typical output characteristics
(T_j = 25°C)

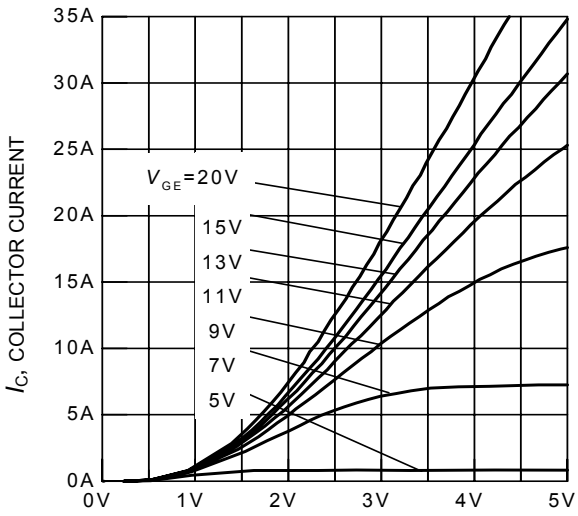


Figure 6. Typical output characteristics
(T_j = 150°C)

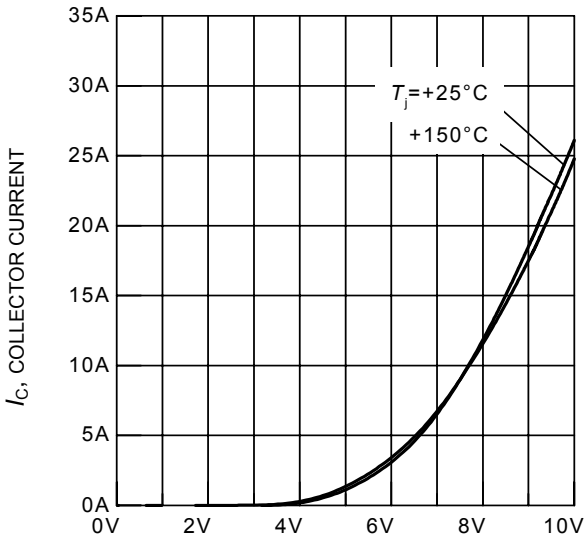


Figure 7. Typical transfer characteristics
(V_{CE} = 10V)

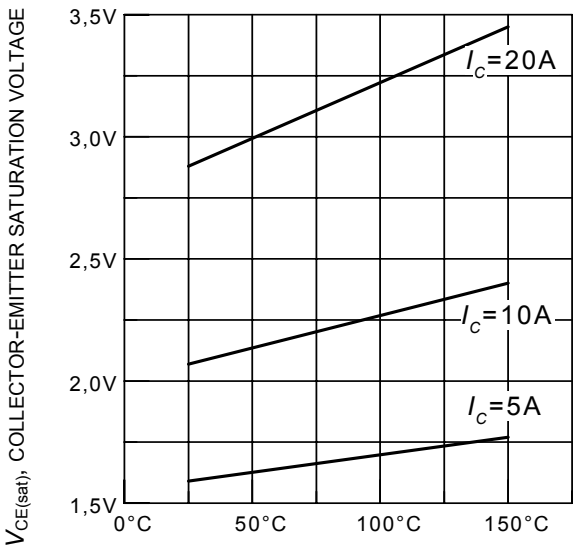


Figure 8. Typical collector-emitter saturation voltage as a function of junction temperature
(V_{GE} = 15V)

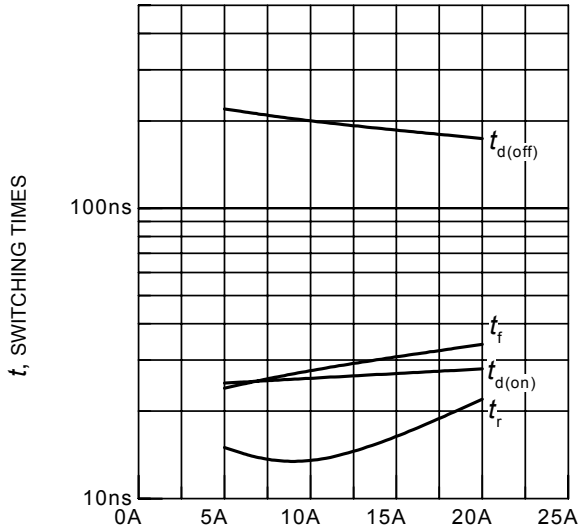


Figure 9. Typical switching times as a function of collector current
(inductive load, T_j = 150°C, V_{CE} = 400V, V_{GE} = 0/+15V, R_G = 25Ω, Dynamic test circuit in Figure E)

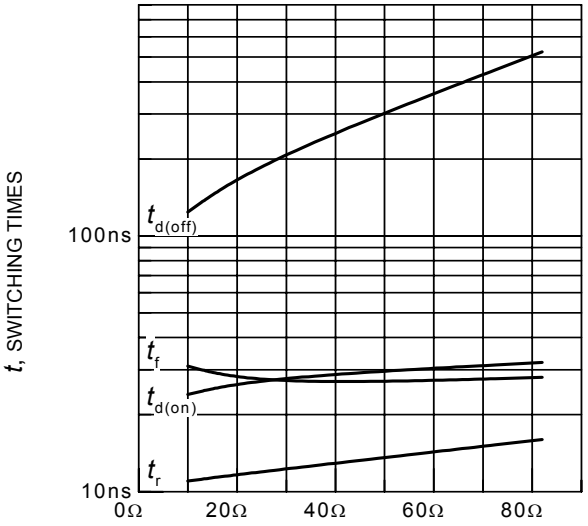


Figure 10. Typical switching times as a function of gate resistor
(inductive load, T_j = 150°C, V_{CE} = 400V, V_{GE} = 0/+15V, I_C = 10A, Dynamic test circuit in Figure E)

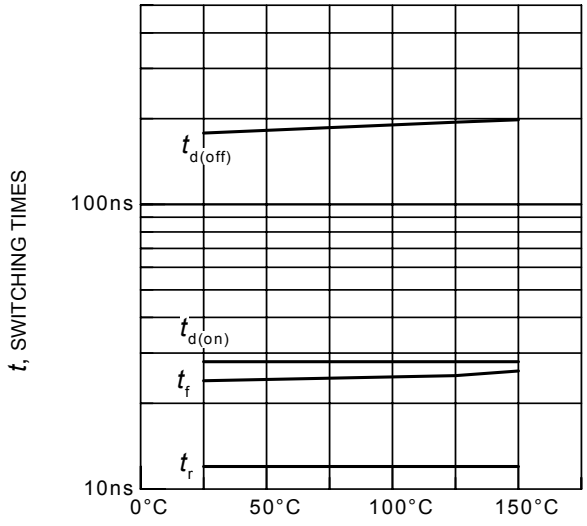


Figure 11. Typical switching times as a function of junction temperature
(inductive load, V_{CE} = 400V, V_{GE} = 0/+15V, I_C = 10A, R_G = 25Ω, Dynamic test circuit in Figure E)

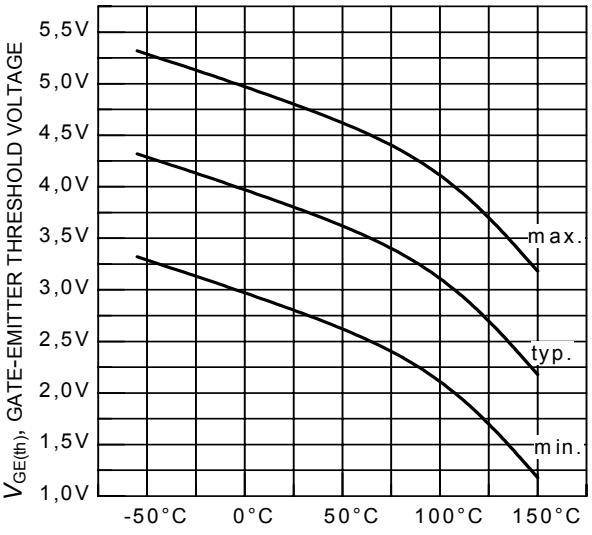


Figure 12. Gate-emitter threshold voltage as a function of junction temperature
(I_C = 0.3mA)

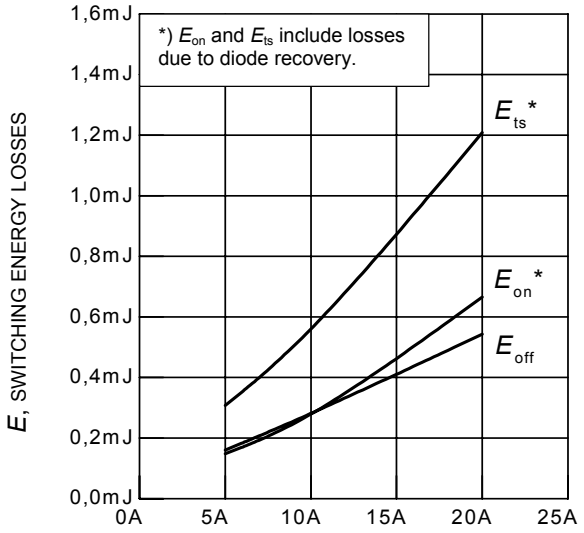


Figure 13. Typical switching energy losses as a function of collector current
(inductive load, T_j = 150°C, V_{CE} = 400V, V_{GE} = 0/+15V, R_G = 25Ω, Dynamic test circuit in Figure E)

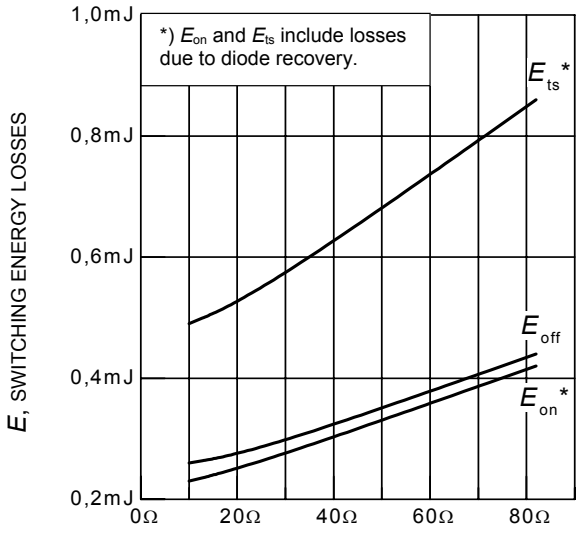


Figure 14. Typical switching energy losses as a function of gate resistor
(inductive load, T_j = 150°C, V_{CE} = 400V, V_{GE} = 0/+15V, I_C = 10A, Dynamic test circuit in Figure E)

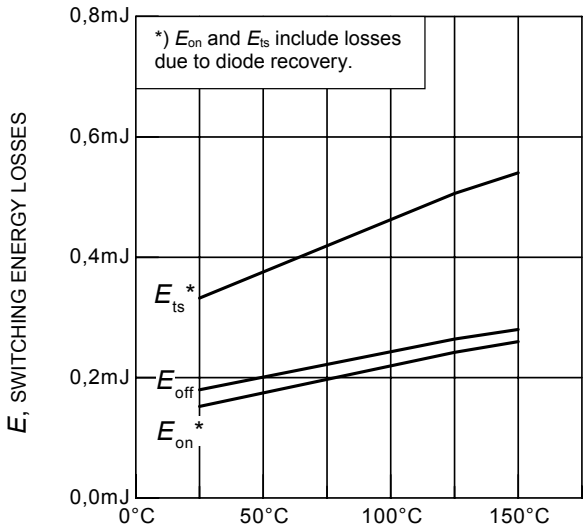


Figure 15. Typical switching energy losses as a function of junction temperature
(inductive load, V_{CE} = 400V, V_{GE} = 0/+15V, I_C = 10A, R_G = 25Ω, Dynamic test circuit in Figure E)

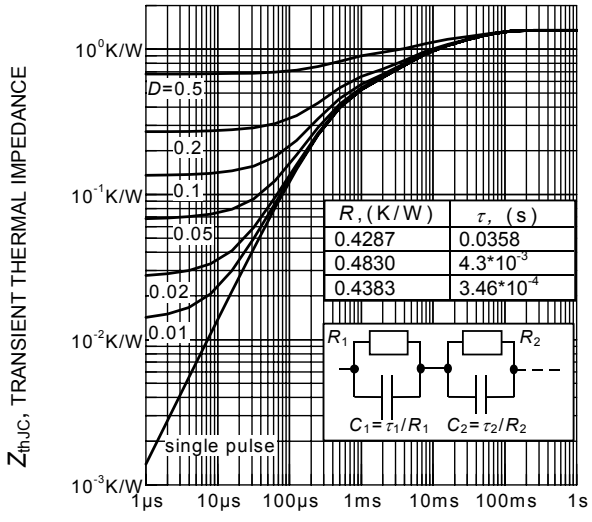


Figure 16. IGBT transient thermal impedance as a function of pulse width
($D = t_p / T$)

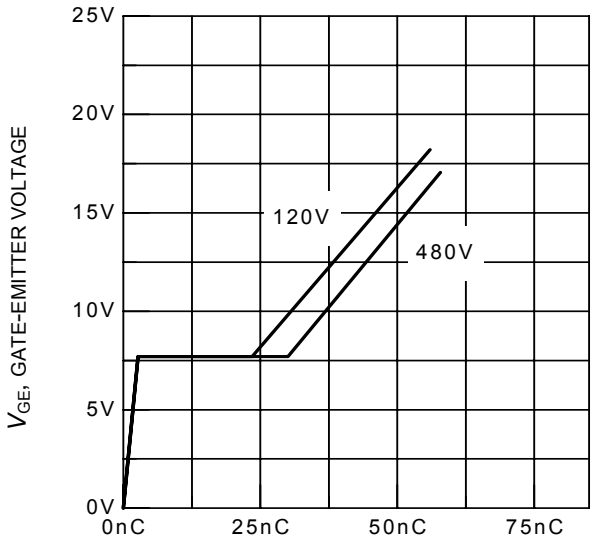


Figure 17. Typical gate charge
(I_C = 10A)

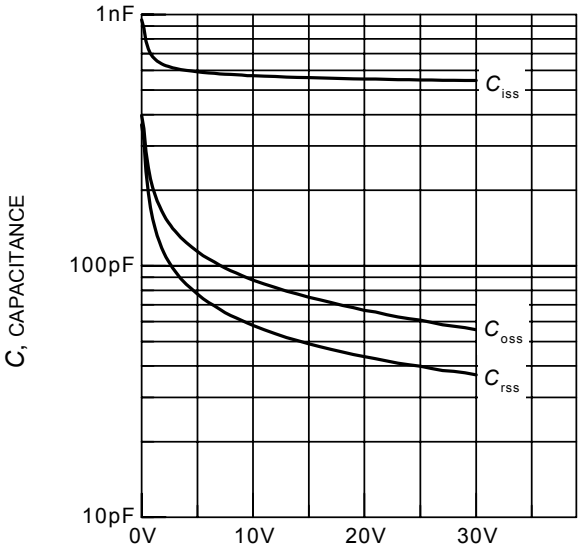


Figure 18. Typical capacitance as a function of collector-emitter voltage
(V_{GE} = 0V, f = 1MHz)

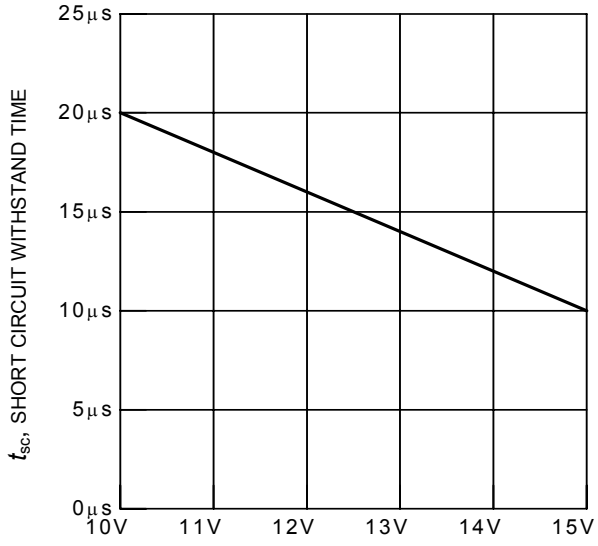


Figure 19. Short circuit withstand time as a function of gate-emitter voltage
(V_{CE} = 600V, start at T_j = 25°C)

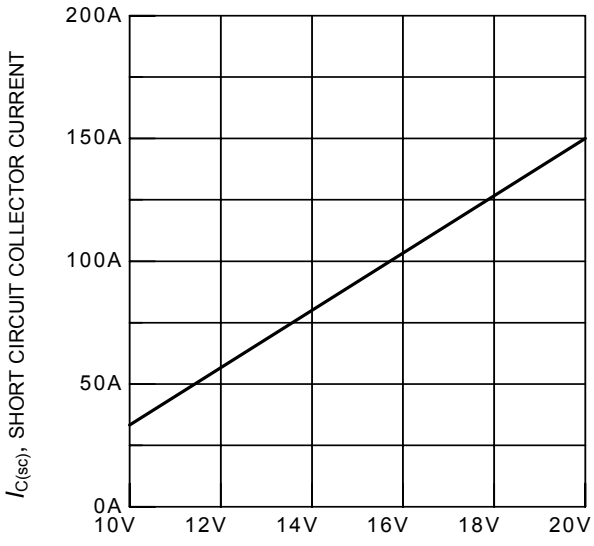
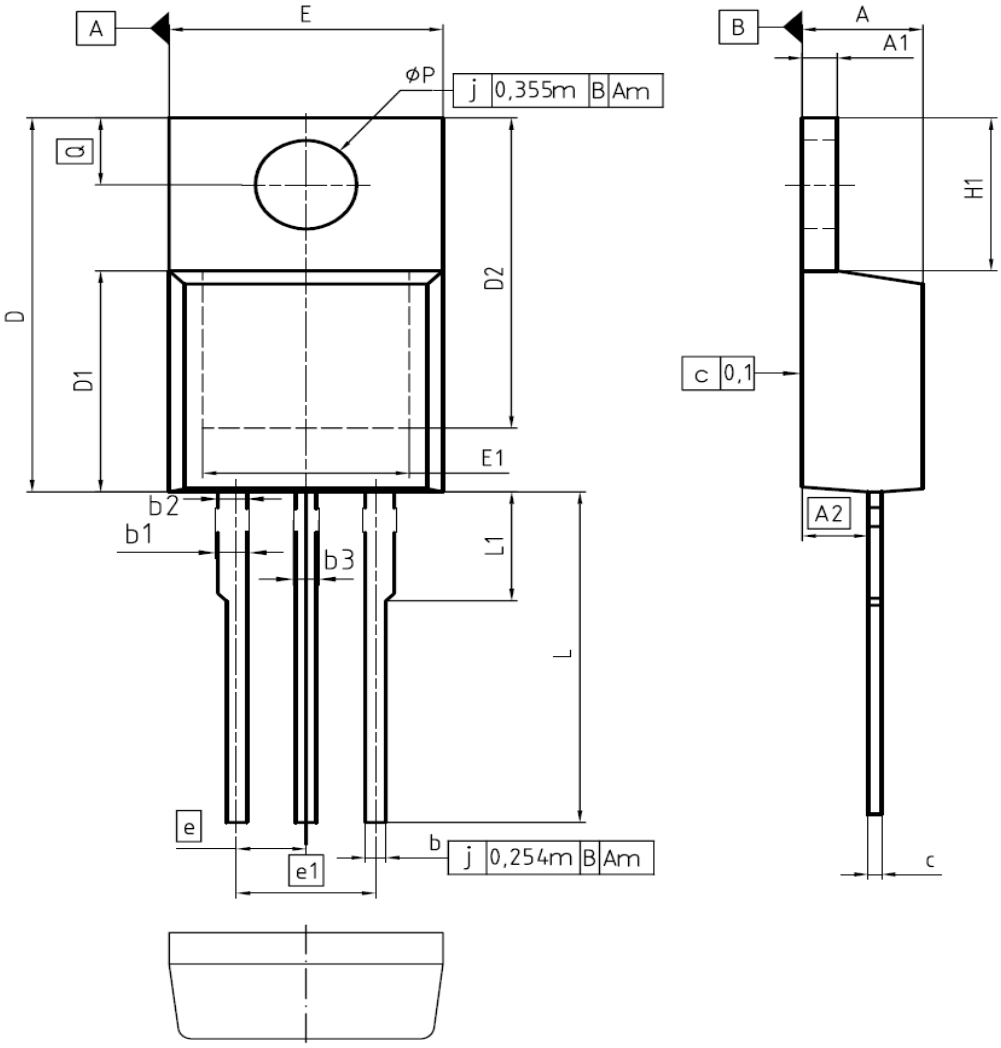


Figure 20. Typical short circuit collector current as a function of gate-emitter voltage
($V_{CE} \leq$ 600V, T_j = 150°C)

PG-TO220-3-1



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	1.17	1.40	0.046	0.055
A2	2.15	2.72	0.085	0.107
b	0.65	0.86	0.026	0.034
b1	0.95	1.40	0.037	0.055
b2	0.95	1.15	0.037	0.045
b3	0.65	1.15	0.026	0.045
c	0.33	0.60	0.013	0.024
D	14.81	15.95	0.583	0.628
D1	8.51	9.45	0.335	0.372
D2	12.19	13.10	0.480	0.516
E	9.70	10.36	0.382	0.408
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	3		3	
H1	5.90	6.90	0.232	0.272
L	13.00	14.00	0.512	0.551
L1	-	4.80	-	0.189
øP	3.60	3.89	0.142	0.153
Q	2.60	3.00	0.102	0.118

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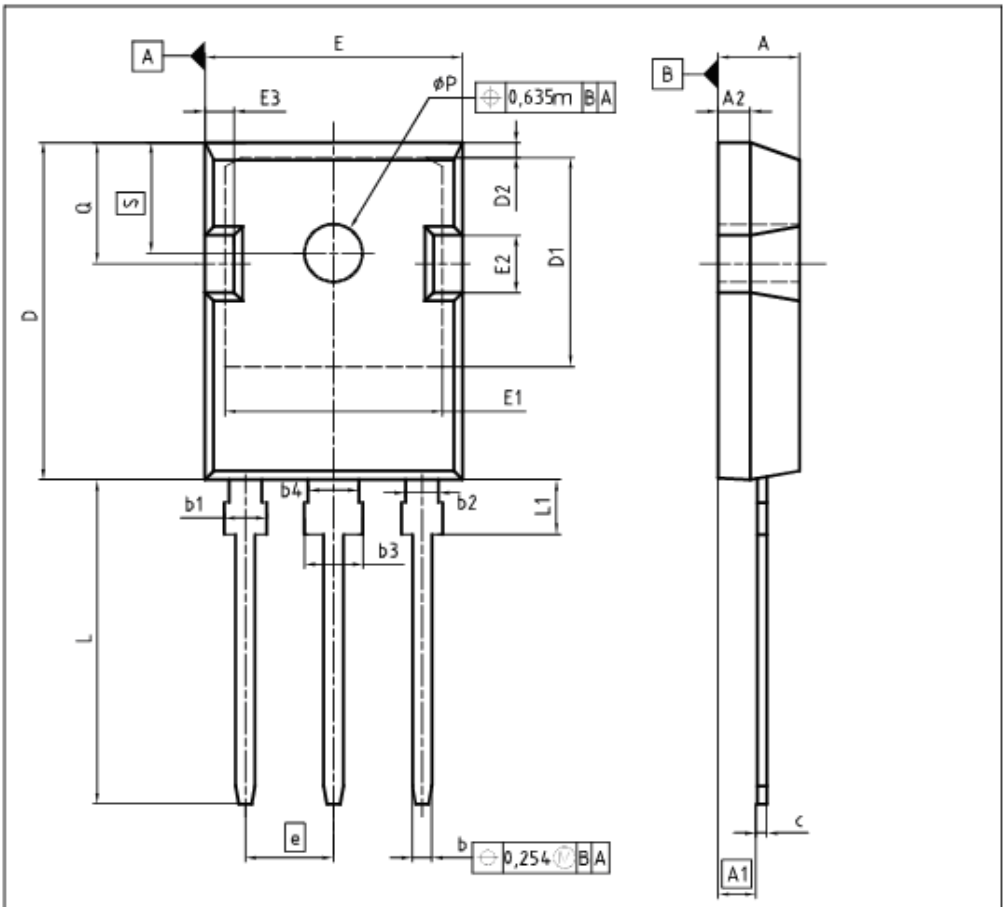
SCALE 0 2.5 0 2.5 5mm

EUROPEAN PROJECTION

ISSUE DATE
23-08-2007

REVISION
05

TO247-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.27	2.54	0.089	0.100
A2	1.85	2.16	0.073	0.085
b	1.07	1.33	0.042	0.052
b1	1.90	2.41	0.075	0.095
b2	1.90	2.16	0.075	0.085
b3	2.87	3.38	0.113	0.133
b4	2.87	3.13	0.113	0.123
c	0.55	0.68	0.022	0.027
D	20.80	21.10	0.819	0.831
D1	16.25	17.65	0.640	0.695
D2	0.95	1.35	0.037	0.053
E	15.70	16.13	0.618	0.635
E1	13.10	14.15	0.516	0.557
E2	3.68	5.10	0.145	0.201
E3	1.00	2.60	0.039	0.102
e	5.44		0.214	
N	3		3	
L	19.80	20.32	0.780	0.800
L1	4.10	4.47	0.161	0.176
øP	3.50	3.70	0.138	0.146
Q	5.49	6.00	0.216	0.236
S	6.04	6.30	0.238	0.248

DOCUMENT NO.
Z8B00003327

SCALE 0 5 5 7.5mm

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04

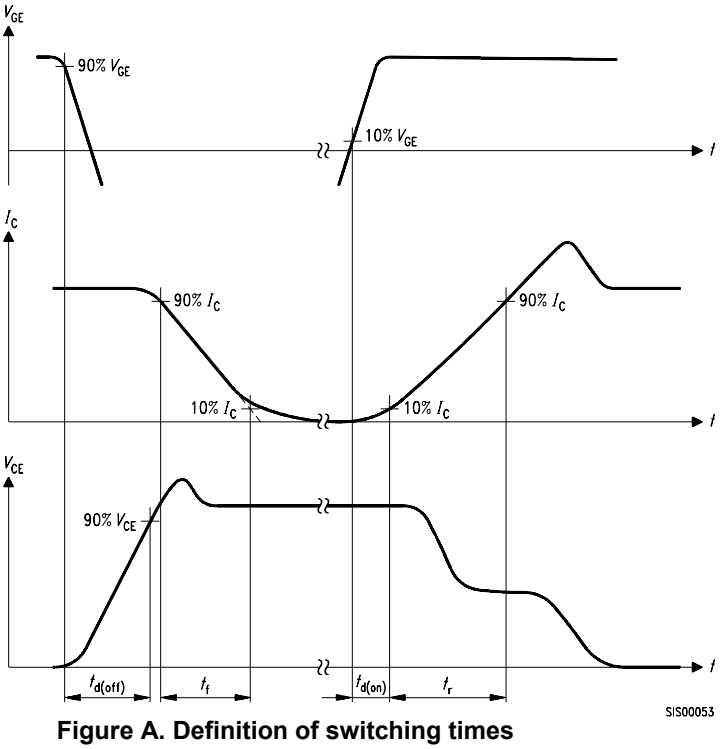


Figure A. Definition of switching times

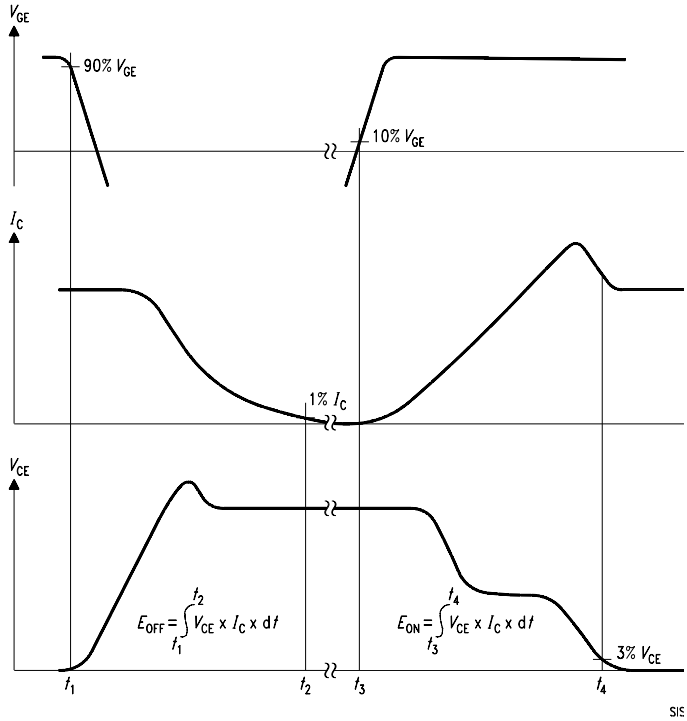


Figure B. Definition of switching losses

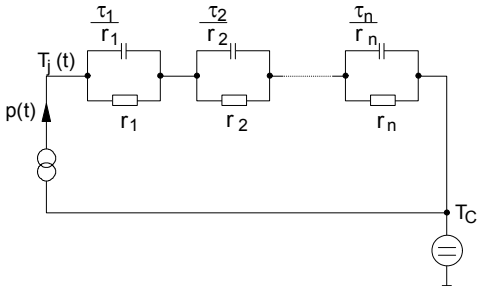


Figure D. Thermal equivalent circuit

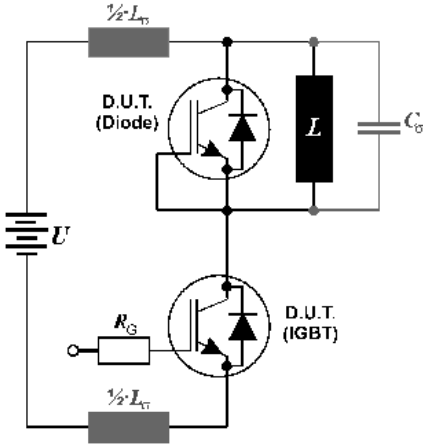


Figure E. Dynamic test circuit
Leakage inductance L_σ =180nH
and Stray capacity C_σ =55pF.

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Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

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