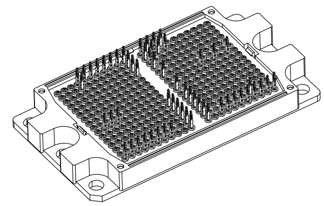
DATA SHEET
www.onsemi.com

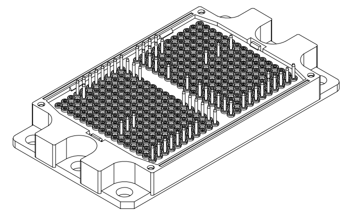
3-Level NPC Inverter Module

NXH600N100L4F5PG, NXH600N100L4F5SG

The NXH600N100L4F5PG / NXH600N100L4F5SG is a power module containing a I−type neutral point clamped three−level inverter. The integrated field stop trench IGBTs and FRDs provide lower conduction losses and switching losses, enabling designers to achieve high efficiency and superior reliability.



PIM52 112x62 (PRESSFIT PIN)
CASE 180HK



PIM60 112x62x12.3 (SOLDER PIN)
CASE 180BJ

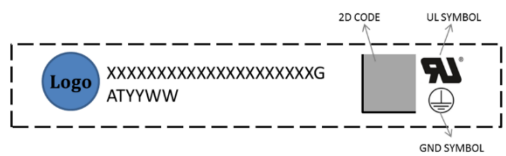
Features

- Neutral Point Clamped Three−level Inverter Module
- 1000 V Field Stop 4 IGBTs
- Low Inductive layout
- Press−fit Pins
- Thermistor
- This is a Pb − Free and Halide Free Device

Typical Applications

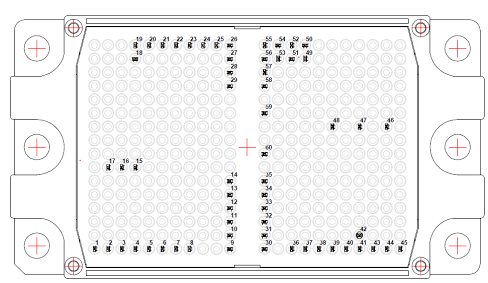
- Solar Inverters
- Energy Storage System
- Uninterruptable Power Supplies Systems

MARKING DIAGRAM



XXXXX = Device Code
G = Pb−Free Package
AT = Assembly & Test Site Code
YYWW = Year and Work Week Code

PIN CONNECTIONS



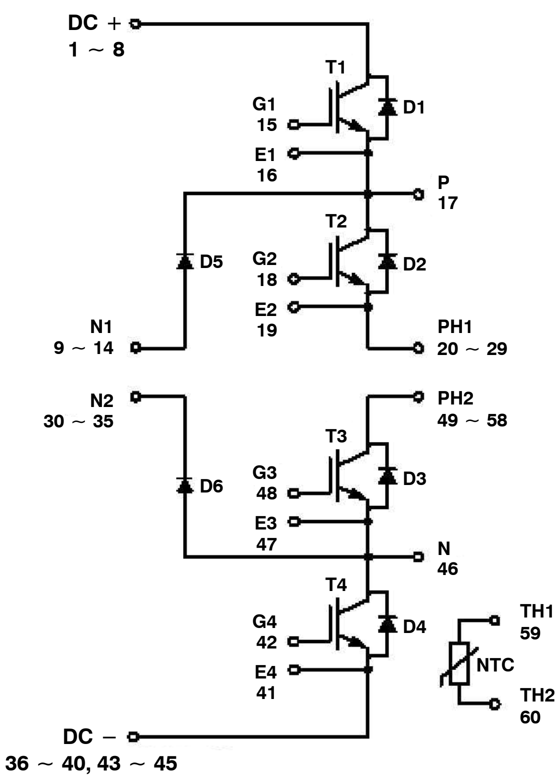


Figure 1. NXH600N100L4F5PG / NXH600N100L4F5SG Schematic Diagram

ORDERING INFORMATION

See detailed ordering and shipping information on page 17 of this data sheet.

MAXIMUM RATINGS

Parameter	Symbol	Max	Unit
OUTER IGBT (T1,T4)			
Collector−Emitter Voltage	V_{CES}	1000	V
Gate−Emitter Voltage Positive Transient Gate−emitter Voltage (Tpulse = 5 μs, D < 0.10)	V_{GE}	±20 30	V
Continuous Collector Current @ T_c = 80°C (T_J = 150°C)	I_C	339	A
Pulsed Collector Current (T_J = 150°C) @ Tpulse = 1 ms	I_{Cpulse}	1017	A
Maximum Power Dissipation (T_J = 150°C, Th = 80°C)	P_{tot}	745	W
Minimum Junction Temperature	T_{JMIN}	−40	°C
Maximum Junction Temperature	T_{JMAX}	175	°C
INNER IGBT (T2,T3)			
Collector−Emitter Voltage	V_{CES}	1000	V
Gate−Emitter Voltage Positive Transient Gate−emitter Voltage (Tpulse = 5 μs, D < 0.10)	V_{GE}	±20 30	V
Continuous Collector Current @ T_c = 80°C (T_J = 150°C)	I_C	337	A
Pulsed Collector Current (T_J = 150°C) @ Tpulse =1ms	I_{Cpulse}	1011	A
Maximum Power Dissipation (T_J = 150°C, Th = 80°C)	P_{tot}	745	W
Minimum Junction Temperature	T_{JMIN}	−40	°C
Maximum Junction Temperature	T_{JMAX}	175	°C
NEUTRAL POINT DIODE (D5, D6)			
Peak Repetitive Reverse Voltage	V_{RRM}	1000	V
Continuous Forward Current @ T_c = 80°C (T_J = 150°C)	I_F	132	A
Repetitive Peak Forward Current (T_J = 150°C) @ Tpulse = 1 ms	I_{FRM}	396	A
Maximum Power Dissipation (T_J = 150°C, Th = 80°C)	P_{tot}	295	W
Minimum Junction Temperature	T_{JMIN}	−40	°C
Maximum Junction Temperature	T_{JMAX}	175	°C
Non−Repetitive Forward Surge Current (T_J = 150°C, Tpulse = 10 ms)	I_{FSM}	700	A
I^2t – Value (t_P = 10 ms, T_{vj} = 150°C)	I@t	2450	A^2s
INVERSE DIODES (D1, D2, D3, D4)			
Peak Repetitive Reverse Voltage	V_{RRM}	1000	V
Continuous Forward Current @ T_c = 80°C (T_J = 150°C)	I_F	137	A
Repetitive Peak Forward Current (T_J = 150°C) @ Tpulse = 1 ms	I_{FRM}	411	A
Maximum Power Dissipation (T_J = 150°C, Th = 80°C)	P_{tot}	295	W
Minimum Junction Temperature	T_{JMIN}	−40	°C
Maximum Junction Temperature	T_{JMAX}	175	°C
Non−Repetitive Forward Surge Current (T_J = 150°C, Tpulse = 10 ms)	I_{FSM}	700	A
I^2t – Value (t_P = 10 ms, T_{vj} = 150°C)	I@t	2450	A^2s
THERMAL PROPERTIES			
Storage Temperature Range	T_{stg}	−40 to 150	°C
INSULATION PROPERTIES			
Isolation Test Voltage, t = 1 min, 50/60 Hz	V_{is}	3400	V_{RMS}
Creepage Distance		12.7	mm
Comparative Tracking Index	CTI	>600	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Refer to ELECTRICAL CHARACTERISTICS, RECOMMENDED OPERATING RANGES and/or APPLICATION INFORMATION for Safe Operating parameters.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Unit
Module Operating Junction Temperature	T_J	−40	150	°C

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Test Condition	Symbol	Min	Typ	Max	Unit
OUTER IGBT (T1, T4)						
Collector−Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} = 1000 V	I_{CES}	–	–	25	μA
Collector−Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 600 A, T_J = 25°C	$V_{CE(sat)}$	–	1.71	2.3	V
	V_{GE} = 15 V, I_C = 600 A, T_J = 150°C		–	1.95	–	
Gate−Emitter Threshold Voltage	V_{GE} = V_{CE}, I_C = 600 mA	$V_{GE(TH)}$	3.9	4.67	5.8	V
Gate Leakage Current	V_{GE} = 20 V, V_{CE} = 0 V	I_{GES}	–	–	1.0	μA
Internal Gate Resistor		R_G	–	1.0	–	Ω
Turn−on Delay Time	T_J = 25°C V_{CE} = 600 V, I_C = 200 A V_{GE} = −9 V to +15 V, R_G (on) = 7 Ω, R_G (off) = 23 Ω	$t_{d(on)}$	–	231.41	–	ns
Rise Time		t_r	–	54.04	–	
Turn−off Delay Time		$t_{d(off)}$	–	1361.48	–	
Fall Time		t_f	–	42.32	–	
Turn−on Switching Loss per Pulse		E_{on}	–	6.62	–	mJ
Turn off Switching Loss per Pulse		E_{off}	–	12.16	–	
Turn−on Delay Time	T_J = 125°C V_{CE} = 600 V, I_C = 200 A V_{GE} = −9 V to +15 V, R_G (on) = 7 Ω, R_G (off) = 23 Ω	$t_{d(on)}$	–	211.22	–	ns
Rise Time		t_r	–	61.09	–	
Turn−off Delay Time		$t_{d(off)}$	–	1517.69	–	
Fall Time		t_f	–	49.22	–	
Turn−on Switching Loss per Pulse		E_{on}	–	10.4	–	mJ
Turn off Switching Loss per Pulse		E_{off}	–	13.98	–	
Input Capacitance	V_{CE} = 20 V. V_{GE} = 0 V. f = 10 kHz	C_{ies}	–	38976.2	–	pF
Output Capacitance		C_{oes}	–	1447.5	–	
Reverse Transfer Capacitance		C_{res}	–	224.2	–	
Total Gate Charge	V_{CE} = 600 V, I_C = 40 A, V_{GE} = ±15 V	Q_g	–	2100	–	nC
Thermal Resistance − Chip−to−heatsink	Thermal grease, Thickness = 2 Mil ±2%, λ = 2.87 W/mK	R_{thJH}	–	0.158	–	°C/W
Thermal Resistance − Chip−to−case		R_{thJC}	–	0.094	–	°C/W
NEUTRAL POINT DIODE (D5, D6)						
Diode Forward Voltage	I_F = 300 A, T_J = 25 °C	V_F	–	2.5	3.2	V
	I_F = 300 A, T_J = 150 °C		–	2.25	–	
Reverse Recovery Time	T_J = 25°C V_{CE} = 600 V, IC = 200 A V_{GE} = −9 V to +15 V, R_G = 7 Ω	t_{rr}	–	46.43	–	ns
Reverse Recovery Charge		Q_{rr}	–	2.786	–	μC
Peak Reverse Recovery Current		I_{RRM}	–	102.29	–	A
Peak Rate of Fall of Recovery Current		di/dt	–	2.95	–	A/μs
Reverse Recovery Energy		E_{rr}	–	881.2	–	μJ

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

Parameter	Test Condition	Symbol	Min	Typ	Max	Unit
NEUTRAL POINT DIODE (D5, D6)						
Reverse Recovery Time	T_J = 125°C V_{CE} = 600 V, I_C = 200 A V_{GE} = –9 V to +15 V, R_G = 7 Ω	t_{rr}	–	133.01	–	ns
Reverse Recovery Charge		Q_{rr}	–	9.767	–	μC
Peak Reverse Recovery Current		I_{RRM}	–	167.7	–	A
Peak Rate of Fall of Recovery Current		di/dt	–	2.73	–	A/μs
Reverse Recovery Energy		E_{rr}	–	3534.9	–	μJ
Thermal Resistance – Chip–to–heatsink	Thermal grease, Thickness = 2 Mil ±2%, λ = 2.87 W/mK	R_{thJH}	–	0.324	–	°C/W
Thermal Resistance – Chip–to–case		R_{thJC}	–	0.237	–	°C/W
INNER IGBT (T2,T3)						
Collector–Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} = 1000 V	I_{CES}	–	–	25	μA
Collector–Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 600 A, T_J = 25°C	$V_{CE(sat)}$	–	1.71	2.30	V
	V_{GE} = 15 V, I_C = 600 A, T_J = 150°C		–	1.96	–	
Gate–Emitter Threshold Voltage	V_{GE} = V_{CE}, I_C = 600 mA	$V_{GE(TH)}$	3.9	4.67	5.8	V
Gate Leakage Current	V_{GE} = 20 V, V_{CE} = 0 V	I_{GES}	–	–	1.0	μA
Internal Gate Resistor		R_G	–	1.0	–	Ω
Turn–on Delay Time	T_J = 25°C V_{CE} = 600 V, I_C = 200 A V_{GE} = –9 V to +15 V, R_G (on) = 15 Ω, R_G (off) = 21 Ω	$t_{d(on)}$	–	417.57	–	ns
Rise Time		t_r	–	76.61	–	
Turn–off Delay Time		$t_{d(off)}$	–	1309.89	–	
Fall Time		t_f	–	86.98	–	
Turn–on Switching Loss per Pulse		E_{on}	–	10.42	–	mJ
Turn off Switching Loss per Pulse		E_{off}	–	15.08	–	
Turn–on Delay Time	T_J = 125°C V_{CE} = 600 V, I_C = 200 A V_{GE} = –9 V to +15 V, R_G (on) = 15Ω, R_G (off) = 21 Ω	$t_{d(on)}$	–	382.03	–	ns
Rise Time		t_r	–	93.33	–	
Turn–off Delay Time		$t_{d(off)}$	–	1420.5	–	
Fall Time		t_f	–	90.31	–	
Turn–on Switching Loss per Pulse		E_{on}	–	14.47	–	mJ
Turn off Switching Loss per Pulse		E_{off}	–	19.12	–	
Input Capacitance	V_{CE} = 20 V. V_{GE} = 0 V. f = 10 kHz	C_{ies}	–	38097.0	–	pF
Output Capacitance		C_{oes}	–	1441.8	–	
Reverse Transfer Capacitance		C_{res}	–	228.0	–	
Total Gate Charge	V_{CE} = 600 V, I_C = 40 A, V_{GE} = ±15 V	Q_g	–	2060	–	nC
Thermal Resistance – Chip–to–heatsink	Thermal grease, Thickness = 2 Mil ±2%, λ = 2.87 W/mK	R_{thJH}	–	0.158	–	°C/W
Thermal Resistance – Chip–to–case		R_{thJC}	–	0.094	–	°C/W
INVERSE DIODES (D1, D2, D3, D4)						
Diode Forward Voltage	I_F = 300 A, T_J = 25°C	V_F	–	2.58	3.2	V
	I_F = 300 A, T_J = 150°C		–	2.35	–	
Reverse Recovery Time	V_{CE} = 600 V, I_C = 200 A V_{GE} = –9 V to +15 V, R_G = 10 Ω	t_{rr}	–	94.95	–	ns
Reverse Recovery Charge		Q_{rr}	–	4.557	–	μC
Peak Reverse Recovery Current		I_{RRM}	–	94.48	–	A
Peak Rate of Fall of Recovery Current		di/dt	–	2.524	–	A/μs
Reverse Recovery Energy		E_{rr}	–	1642	–	μJ

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

Parameter	Test Condition	Symbol	Min	Typ	Max	Unit
INVERSE DIODES (D1, D2, D3, D4)						
Reverse Recovery Time	T_J = 125 °C V_{CE} = 600 V, I_C = 200 A V_{GE} = −9 V to +15 V, R_G = 10 Ω	t_{rr}	–	172.16	–	ns
Reverse Recovery Charge		Q_{rr}	–	12.574	–	μC
Peak Reverse Recovery Current		I_{RRM}	–	146.25	–	A
Peak Rate of Fall of Recovery Current		di/dt	–	2.169	–	A/μs
Reverse Recovery Energy		E_{rr}	–	5550	–	μJ
Thermal Resistance − Chip−to−heatsink	Thermal grease, Thickness = 2 Mil ±2%, λ = 2.87 W/mK	R_{thJH}	–	0.324	–	°C/W
Thermal Resistance − Chip−to−case		R_{thJC}	–	0.237	–	°C/W
THERMISTOR CHARACTERISTICS						
Nominal Resistance	T = 25°C	R_{25}	–	5	–	kΩ
Nominal Resistance	T = 100°C	R_{100}	–	492.2	–	Ω
Deviation of R25		ΔR/R	−1	–	1	%
Power Dissipation		P_D	–	5	–	mW
Power Dissipation Constant			–	1.3	–	mW/K
B−value	B(25/85), tolerance ±1%		–	3430	–	K

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL CHARACTERISTICS – IGBT T1/T4 AND D5/D6 DIODE

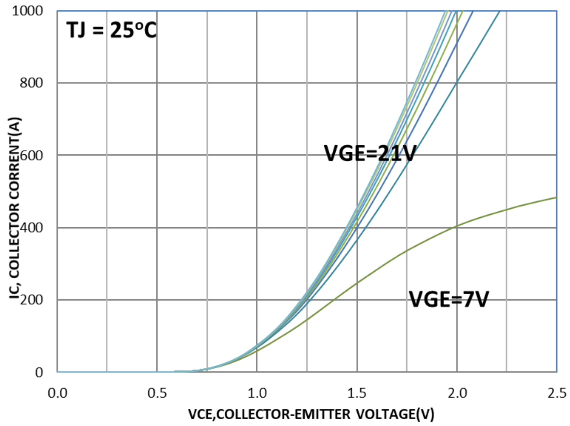


Figure 2. Typical Output Characteristics

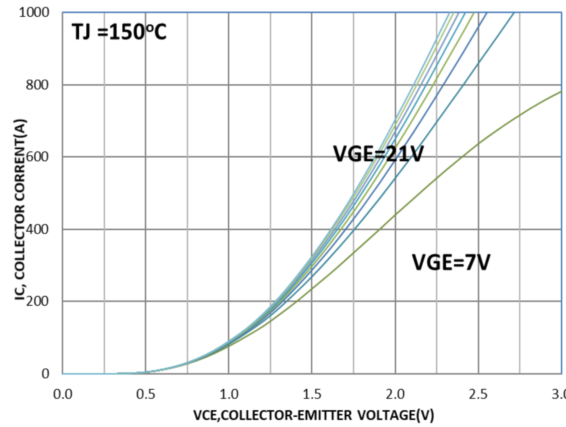


Figure 3. Typical Output Characteristics

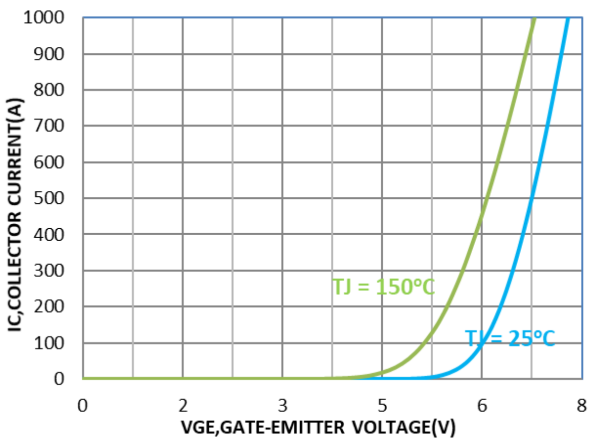


Figure 4. Transfer Characteristics

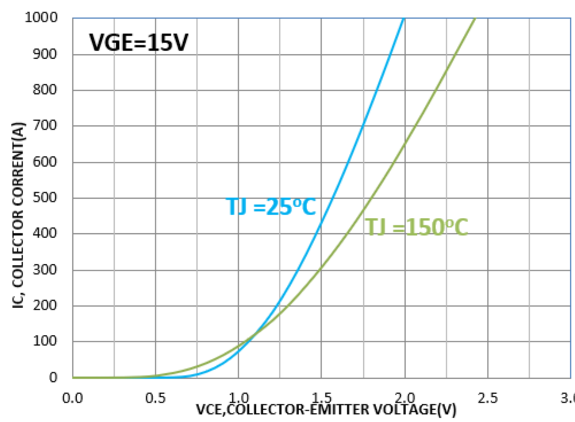


Figure 5. Saturation Voltage Characteristic

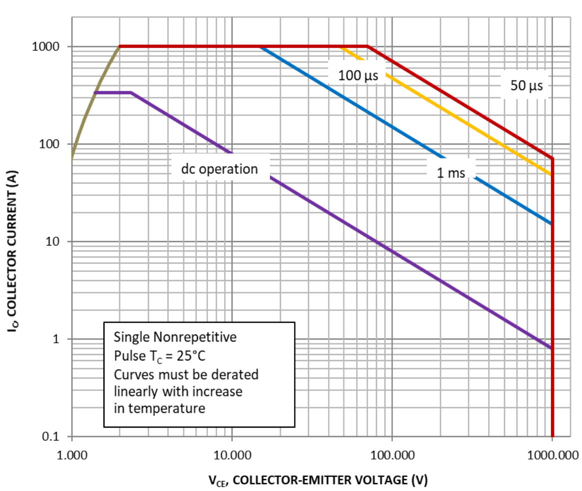


Figure 6. FBSOA

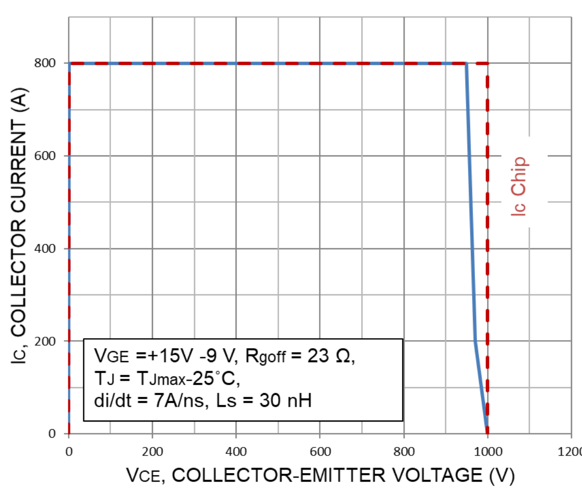


Figure 7. RBSOA

TYPICAL CHARACTERISTICS – IGBT T1/T4 AND D5/D6 DIODE (CONTINUED)

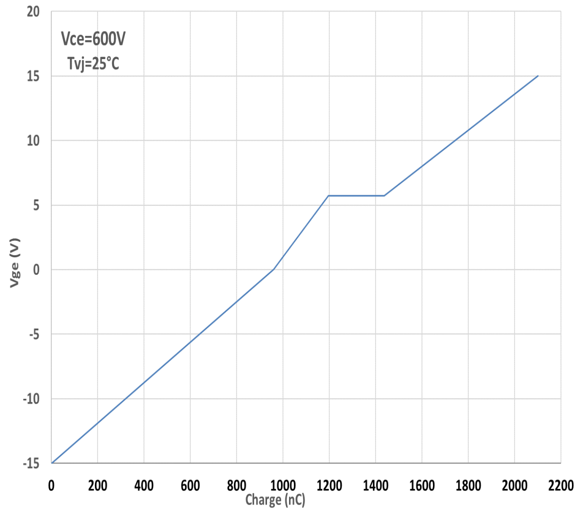


Figure 8. Gate Voltage vs. Gate Charge

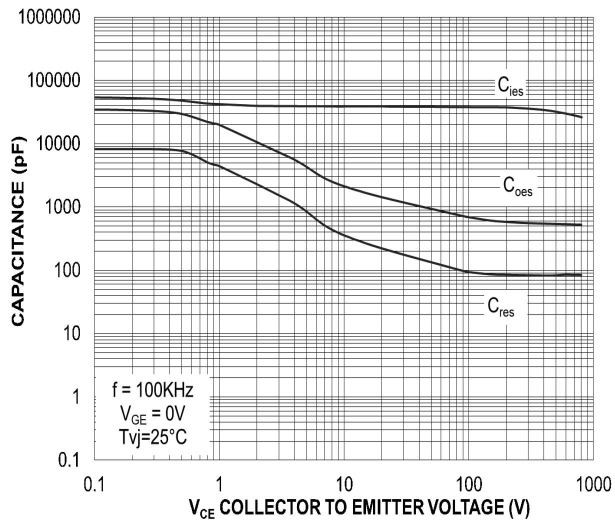


Figure 9. Capacitance

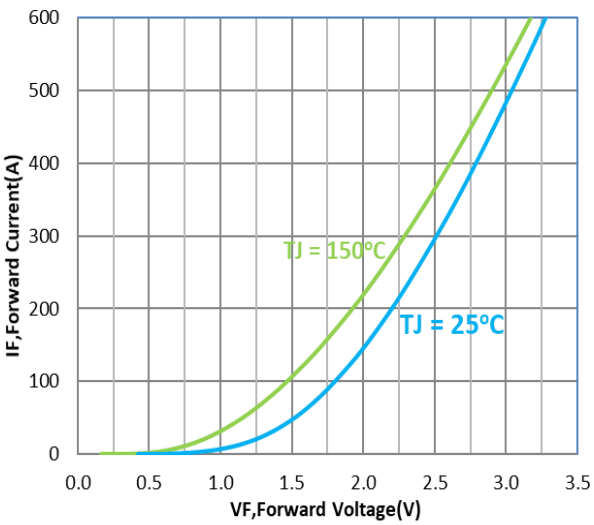


Figure 10. Diode Forward Characteristics

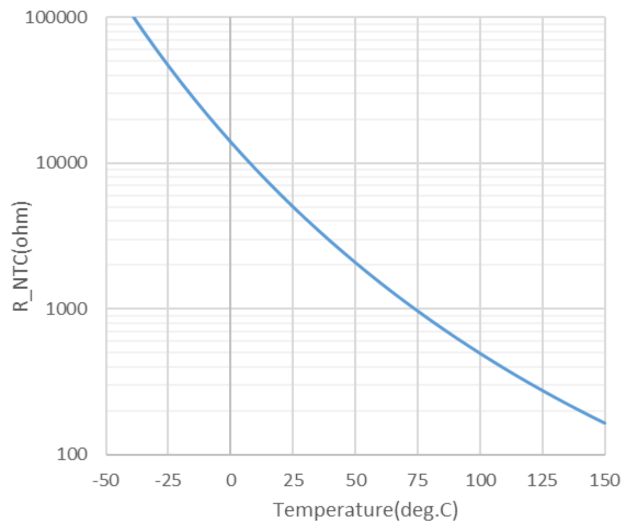


Figure 11. Temperature vs. NTC Value

TYPICAL CHARACTERISTICS – IGBT T2/T3 AND D3/D4, D1/D2 DIODE

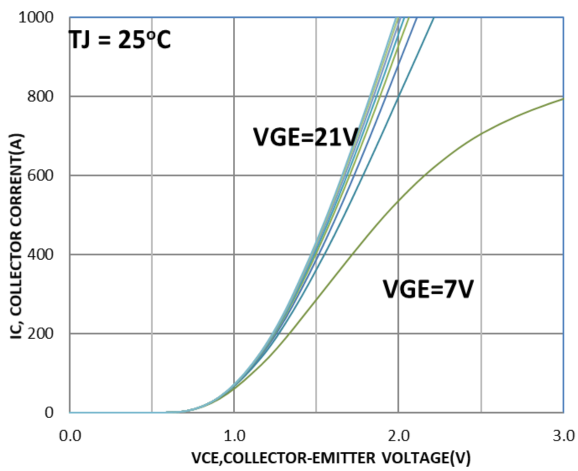


Figure 12. Typical Output Characteristics

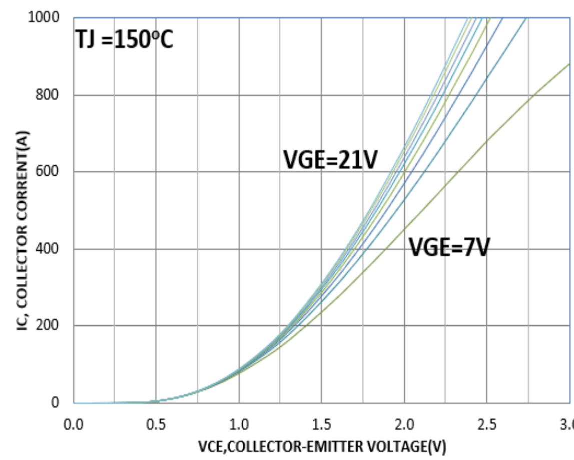


Figure 13. Typical Output Characteristics

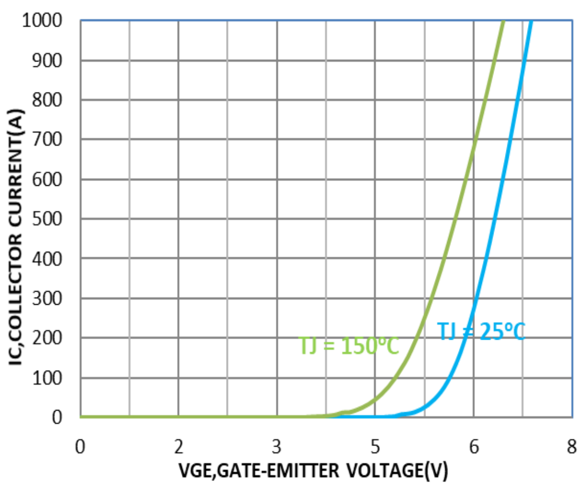


Figure 14. Transfer Characteristics

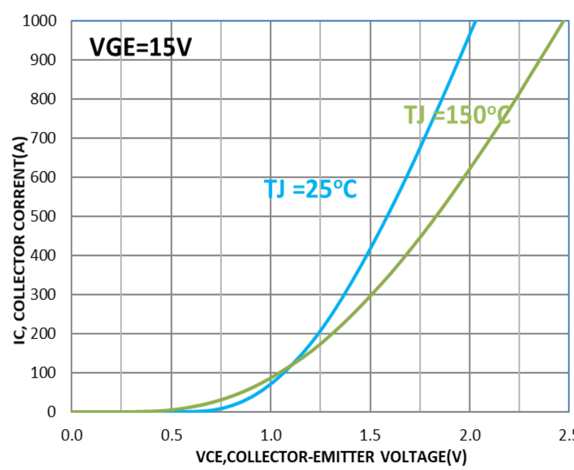


Figure 15. Saturation Voltage Characteristic

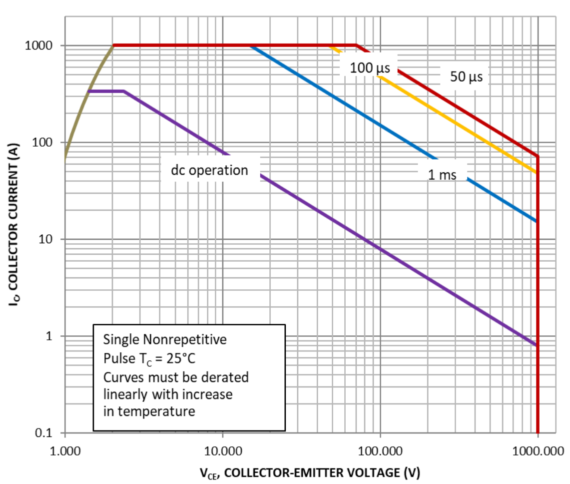


Figure 16. FBSOA

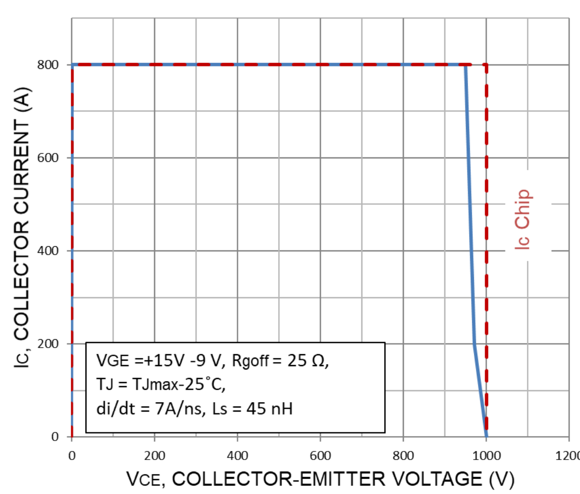


Figure 17. RBSOA

TYPICAL CHARACTERISTICS – IGBT T2/T3 AND D3/D4, D1/D2 DIODE (CONTINUED)

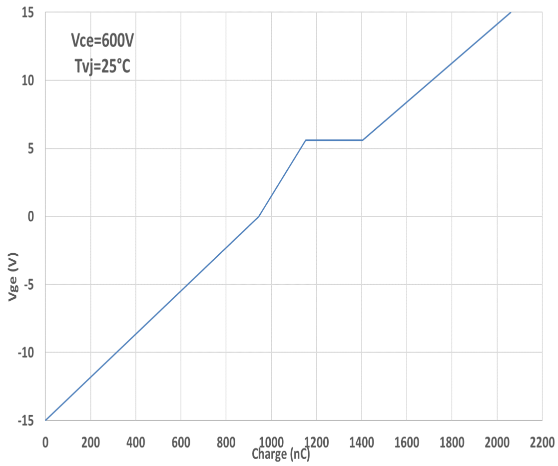


Figure 18. Gate Voltage vs. Gate Charge

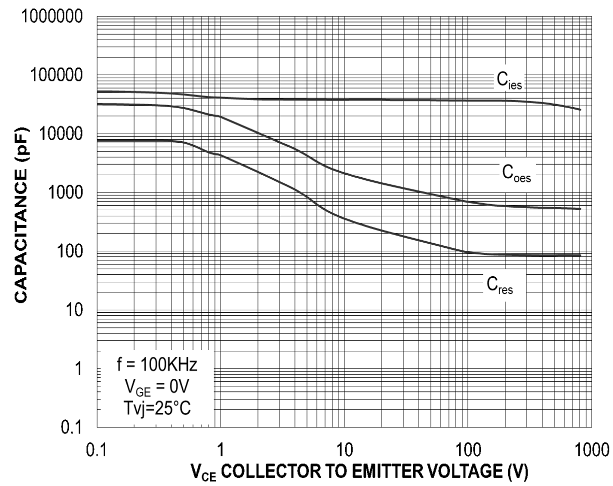


Figure 19. Capacitance

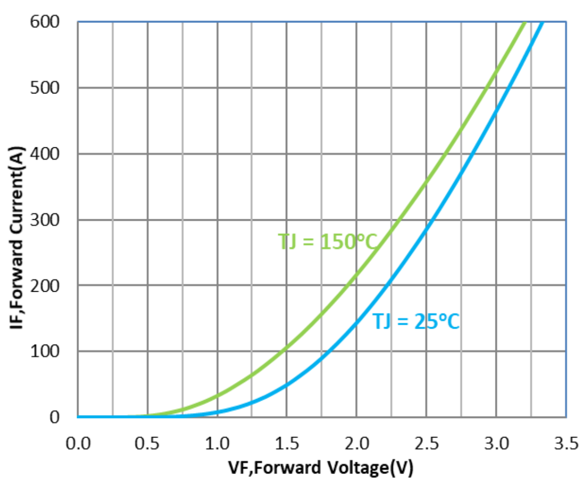


Figure 20. Diode Forward Characteristics

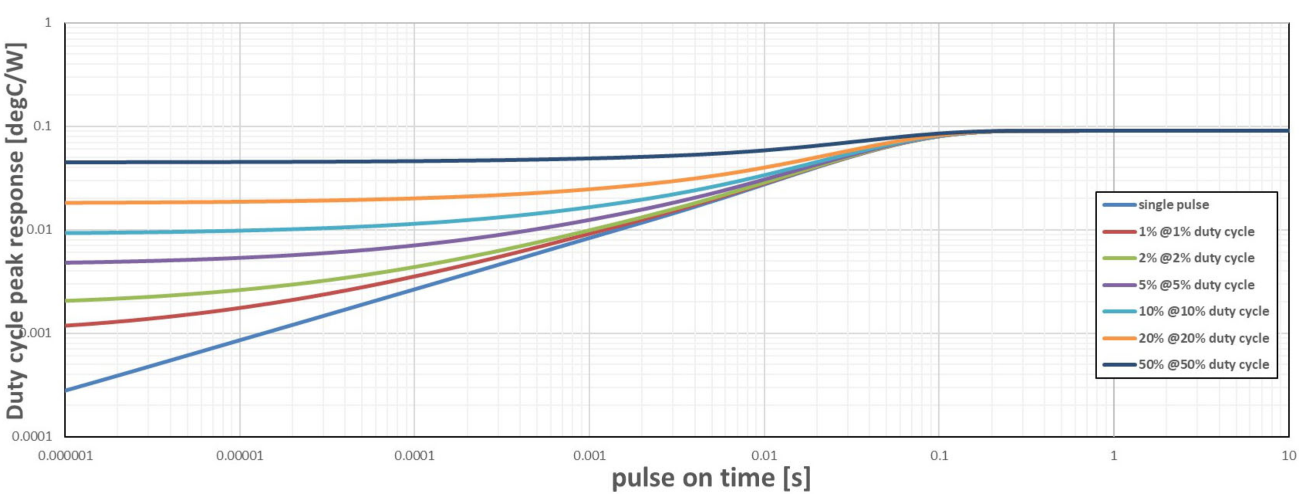


Figure 21. Transient Thermal Impedance (IGBT Rthjc)

TYPICAL CHARACTERISTICS – IGBT T2/T3 AND D3/D4, D1/D2 DIODE (CONTINUED)

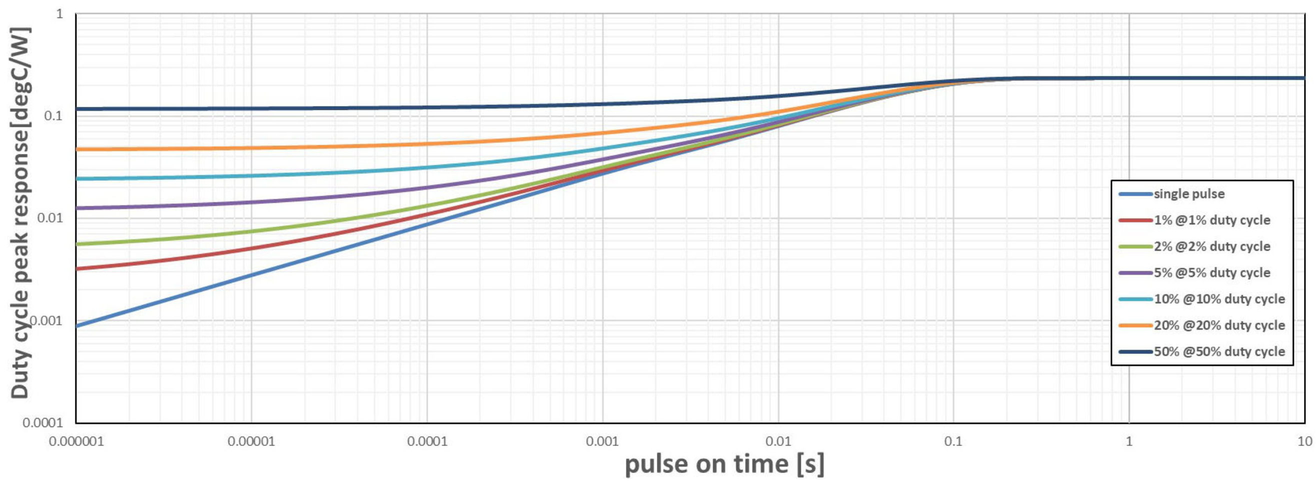


Figure 22. Transient Thermal Impedance (DIODE Rthjc)

TYPICAL CHARACTERISTICS – T1||D5 OR T4||D6

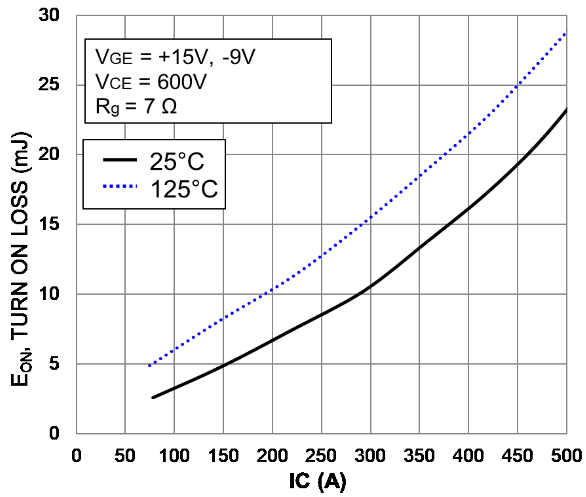


Figure 23. Typical Turn On Loss vs. I_C

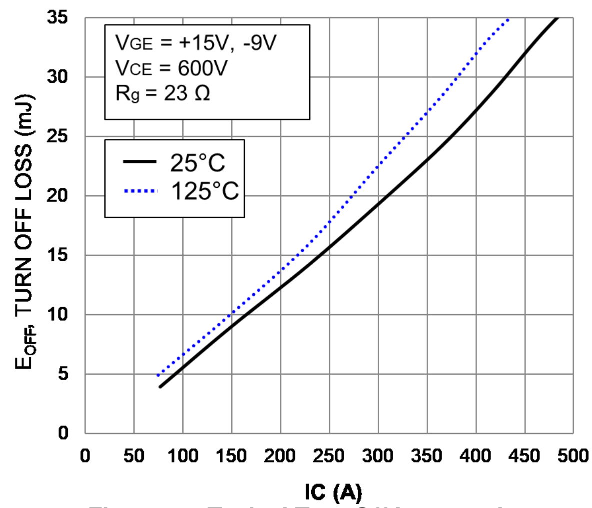


Figure 24. Typical Turn Off Loss vs. I_C

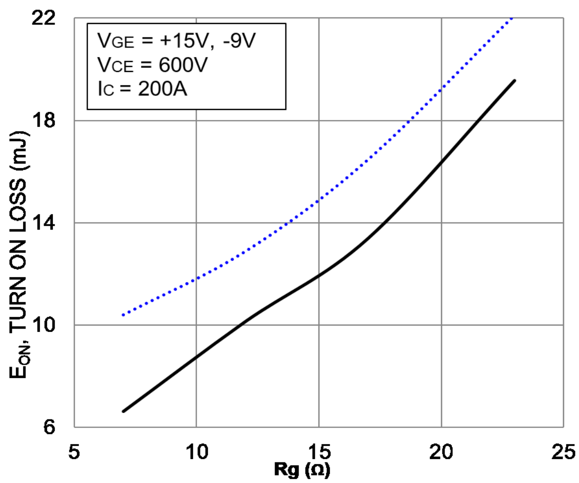


Figure 25. Typical Turn On Loss vs. Rg

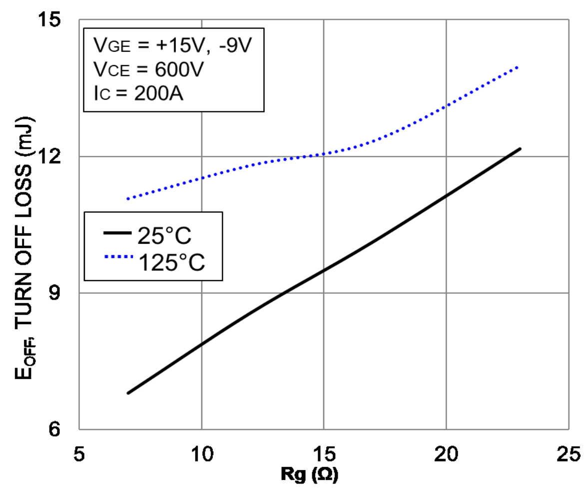


Figure 26. Typical Turn Off Loss vs. Rg

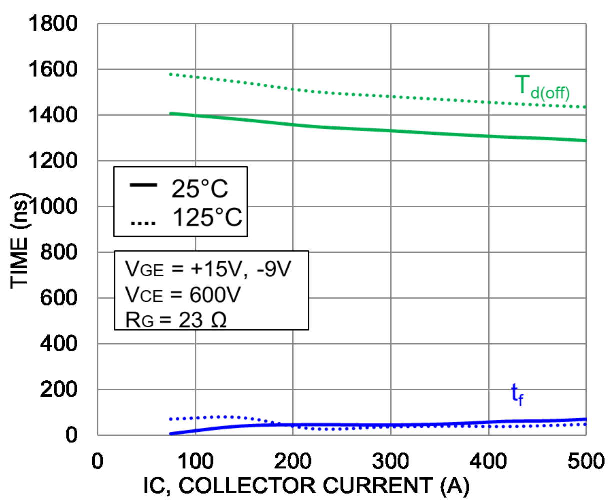


Figure 27. Typical Turn−Off Switching Time vs. I_C

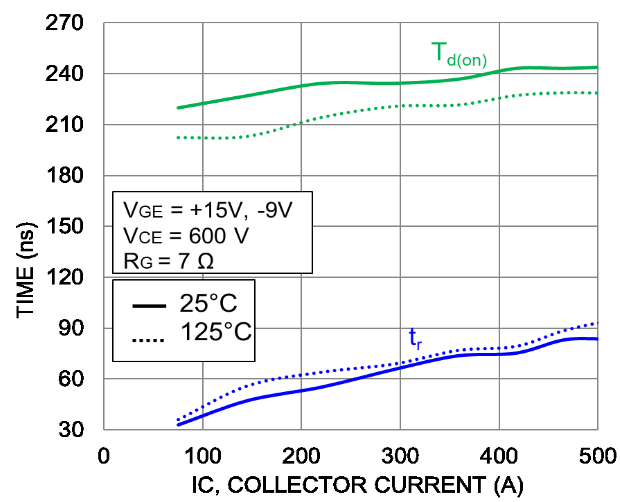


Figure 28. Typical Turn−On Switching Time vs. I_C

TYPICAL CHARACTERISTICS – T1||D5 OR T4||D6 (CONTINUED)

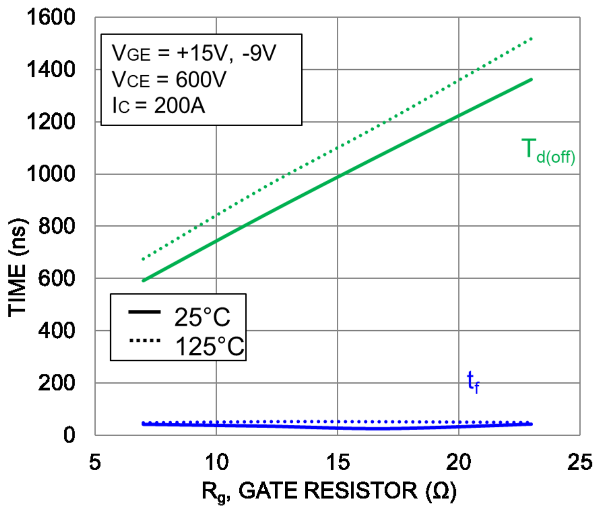


Figure 29. Typical Turn−Off Switching Time vs. Rg

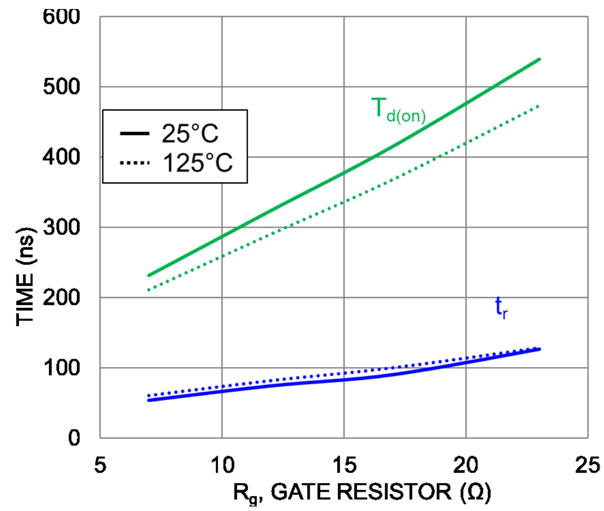


Figure 30. Typical Turn−On Switching Time vs. Rg

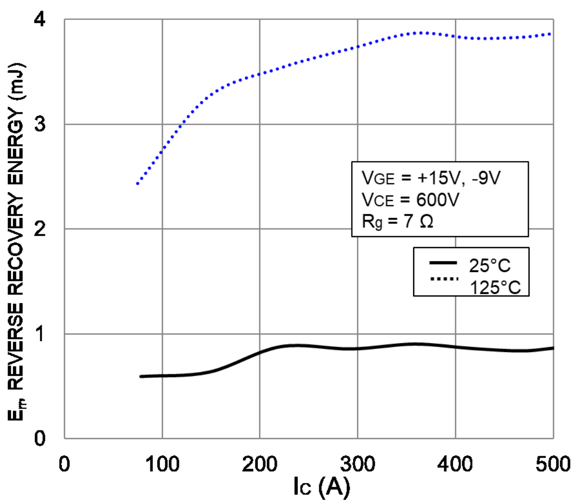


Figure 31. Typical Reverse Recovery Energy Loss vs. I_C

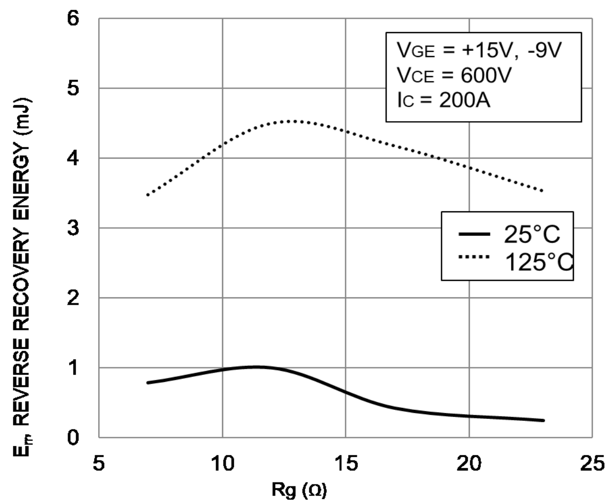


Figure 32. Typical Reverse Recovery Energy Loss vs. Rg

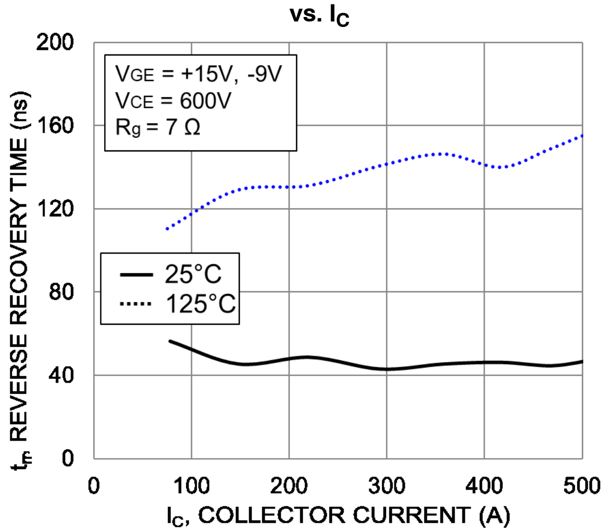


Figure 33. Typical Reverse Recovery Time vs. I_C

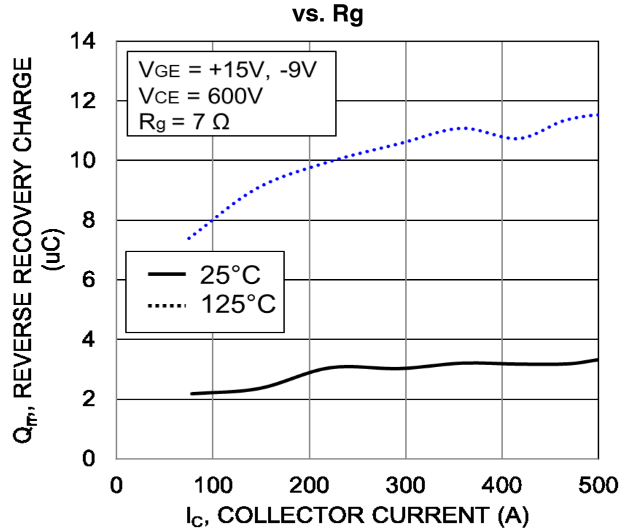


Figure 34. Typical Reverse Recovery Charge vs. I_C

TYPICAL CHARACTERISTICS – T1 | |D5 OR T4 | |D6 (CONTINUED)

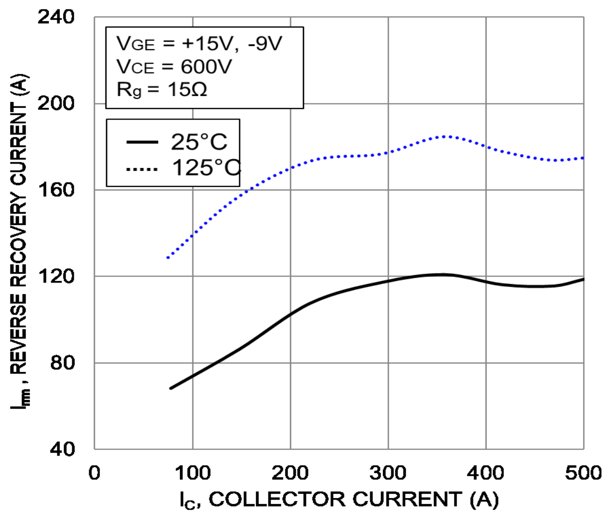


Figure 35. Typical Reverse Recovery Current vs. I_C

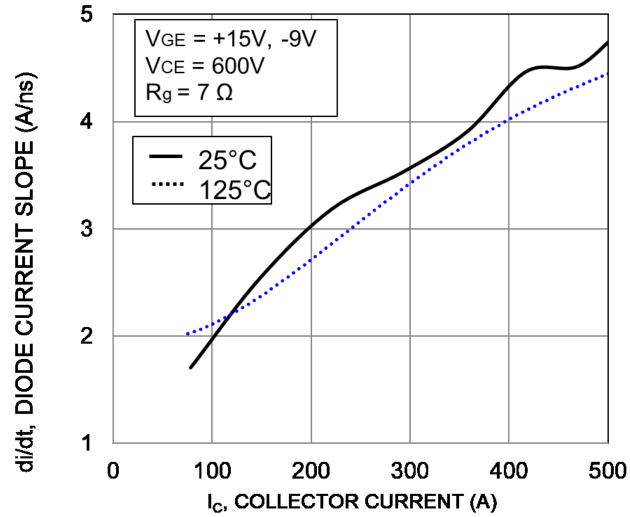


Figure 36. Typical di/dt vs. I_C

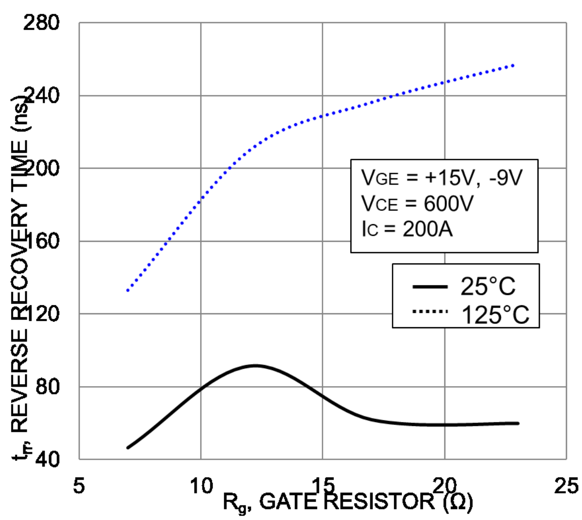


Figure 37. Typical Reverse Recovery Time vs. Rg

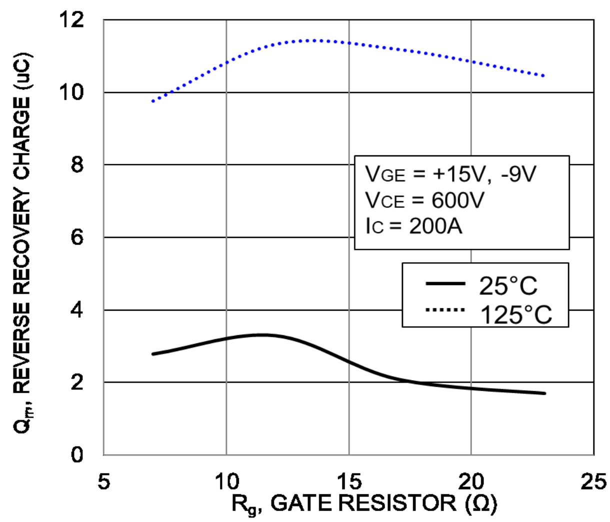


Figure 38. Typical Reverse Recovery Charge vs. Rg

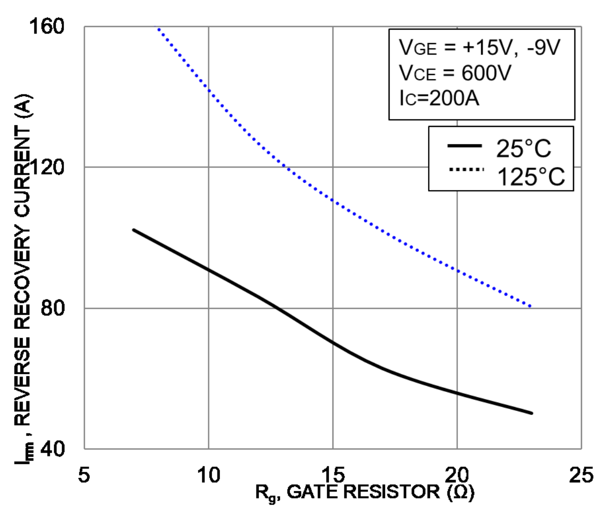


Figure 39. Typical Reverse Recovery Peak Current vs. Rg

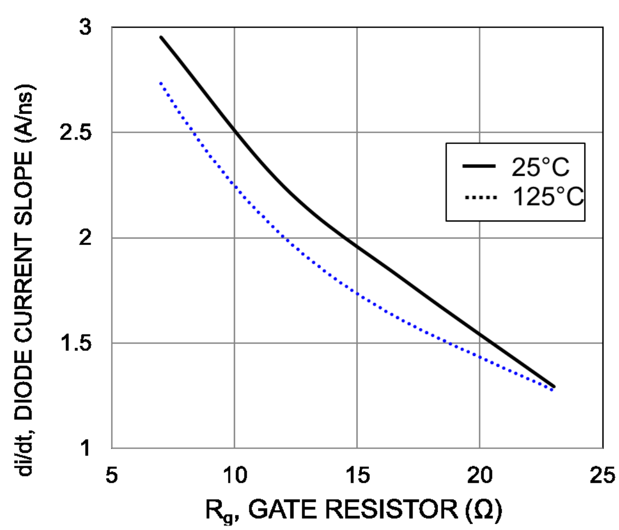


Figure 40. Typical di/dt vs. Rg

TYPICAL CHARACTERISTICS – T2||D3 + D4 OR T3||D1 +D2

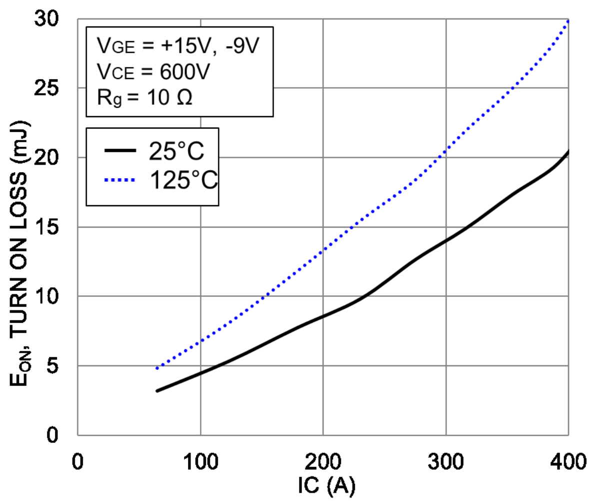


Figure 41. Typical Turn On Loss vs. I_C

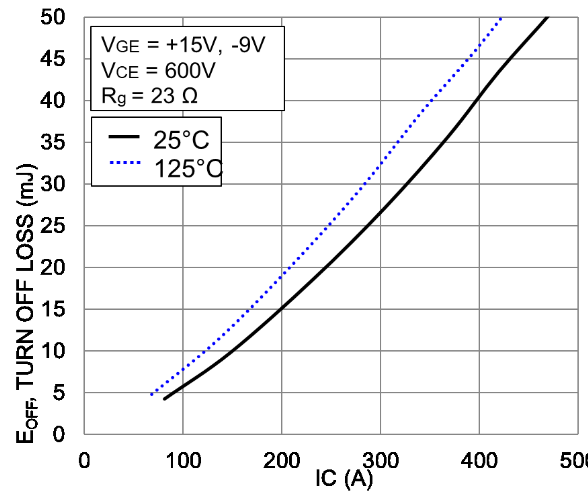


Figure 42. Typical Turn Off Loss vs. I_C

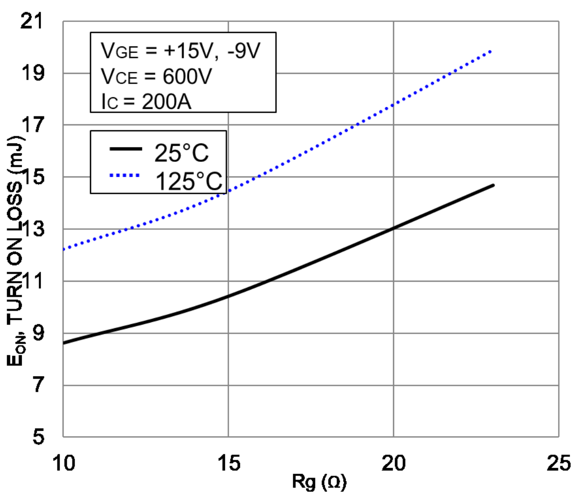


Figure 43. Typical Turn On Loss vs. Rg

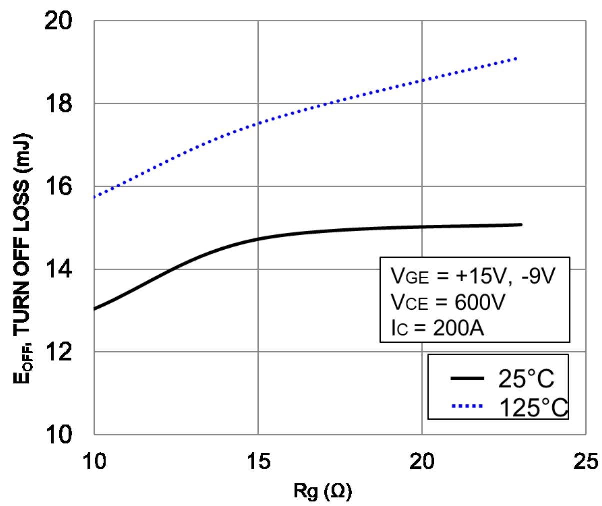


Figure 44. Typical Turn Off Loss vs. Rg

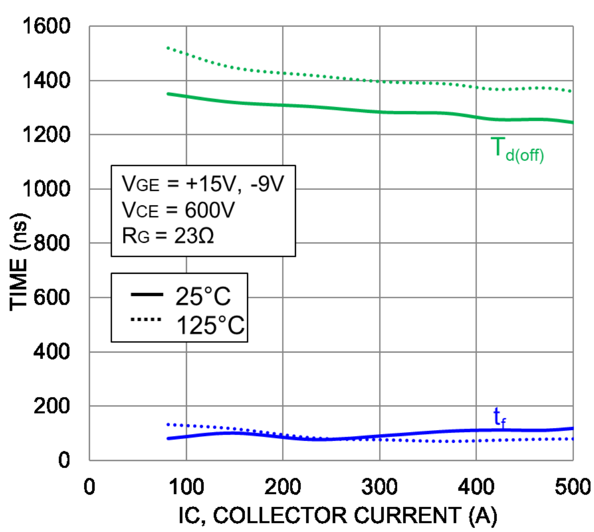


Figure 45. Typical Turn−Off Switching Time vs. I_C

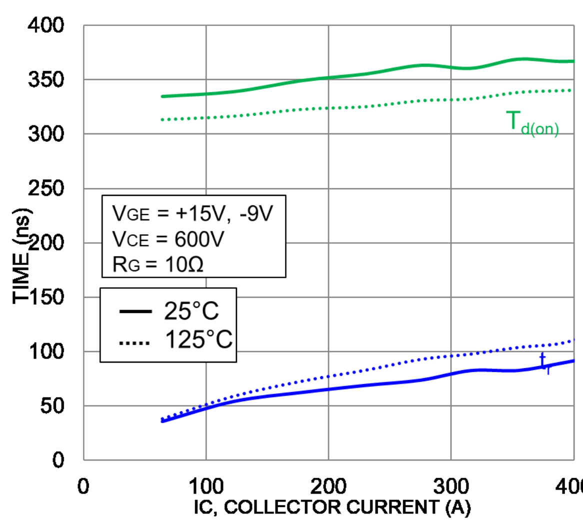


Figure 46. Typical Turn−On Switching Time vs. I_C

TYPICAL CHARACTERISTICS – T2||D3 + D4 OR T3||D1 +D2 (CONTINUED)

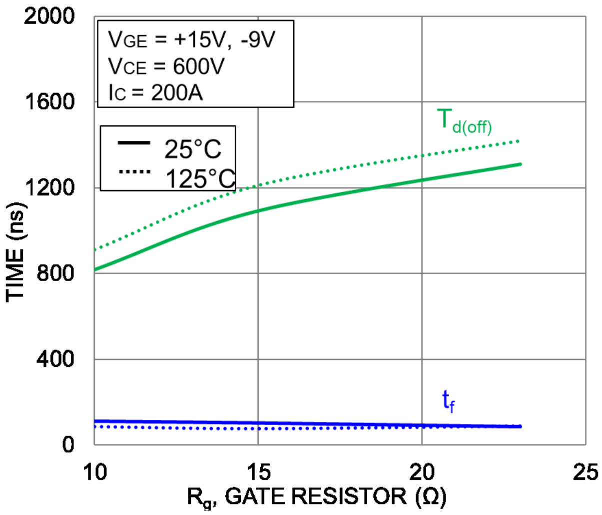


Figure 47. Typical Turn−Off Switching Time vs. Rg

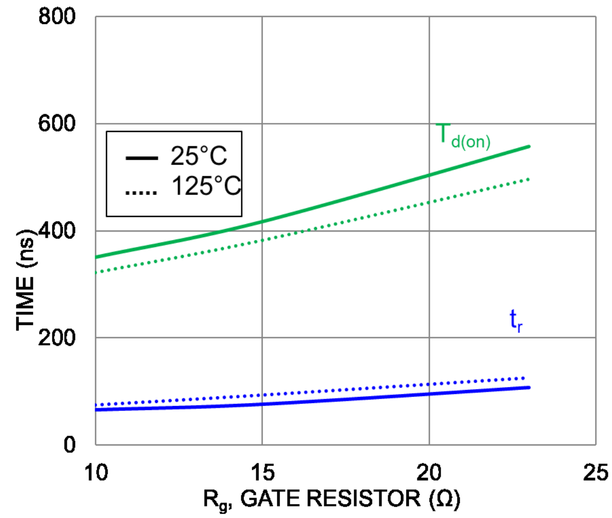


Figure 48. Typical Turn−On Switching Time vs. Rg

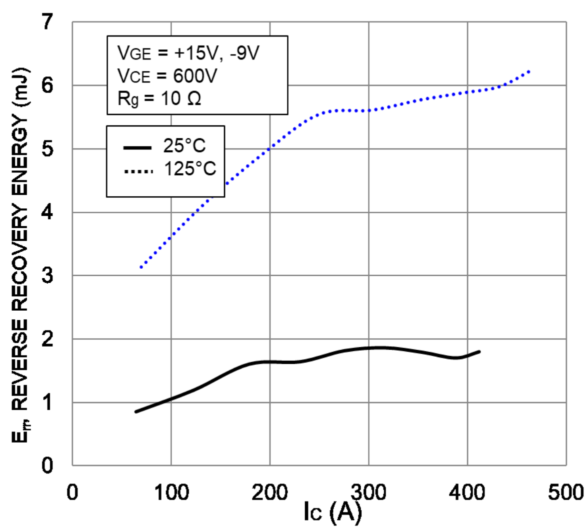


Figure 49. Typical Reverse Recovery Energy Loss vs. I_C

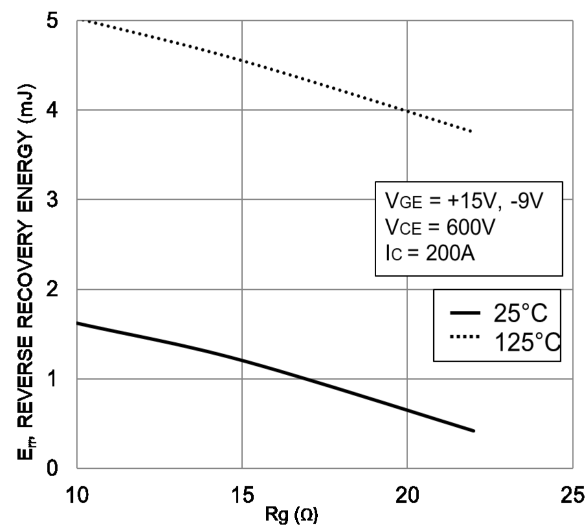


Figure 50. Typical Reverse Recovery Energy Loss vs. Rg

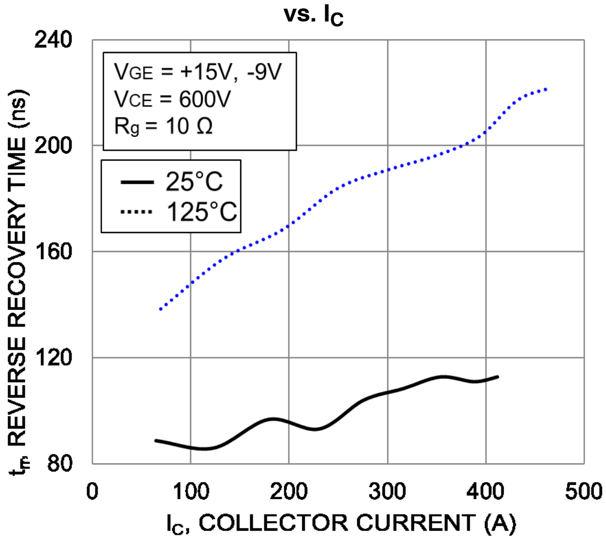


Figure 51. Typical Reverse Recovery Time vs. I_C

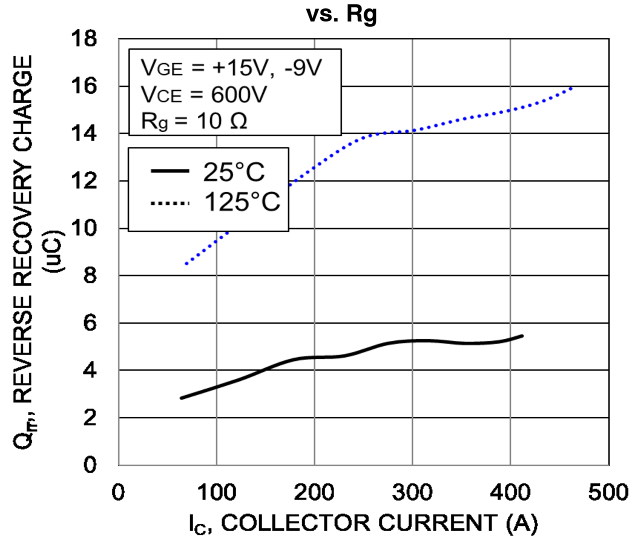


Figure 52. Typical Reverse Recovery Charge vs. I_C

TYPICAL CHARACTERISTICS – T2||D3 + D4 OR T3||D1 +D2 (CONTINUED)

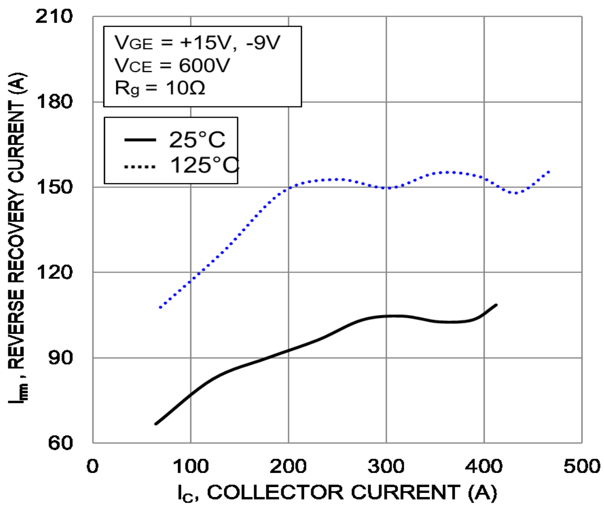


Figure 53. Typical Reverse Recovery Current vs. I_C

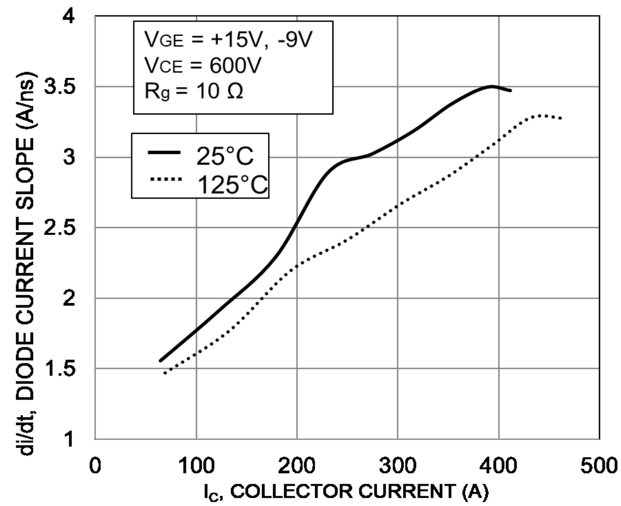


Figure 54. Typical di/dt vs. I_C

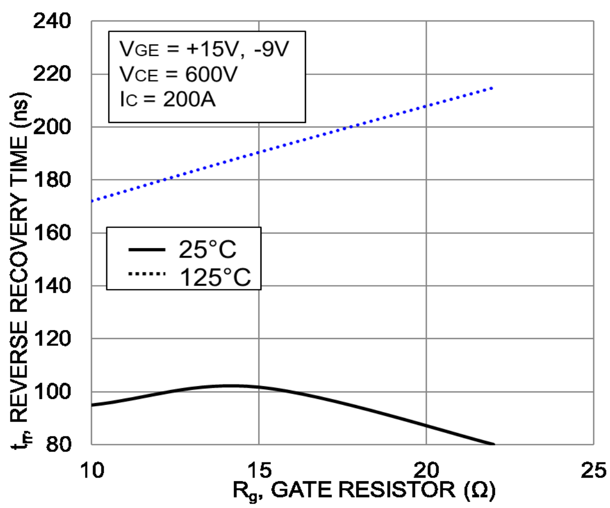


Figure 55. Typical Reverse Recovery Time vs. Rg

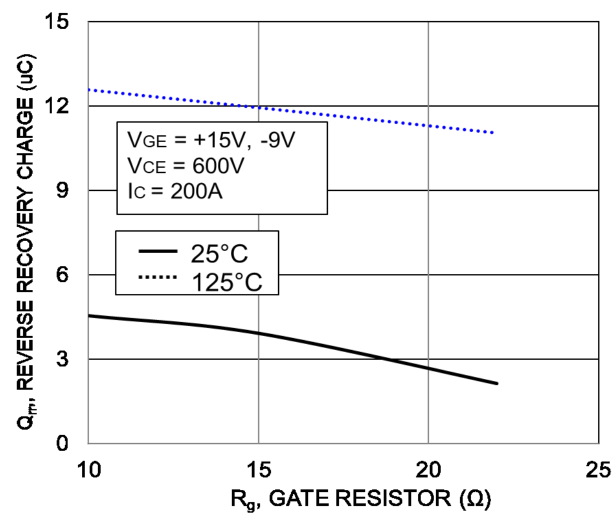


Figure 56. Typical Reverse Recovery Charge vs. Rg

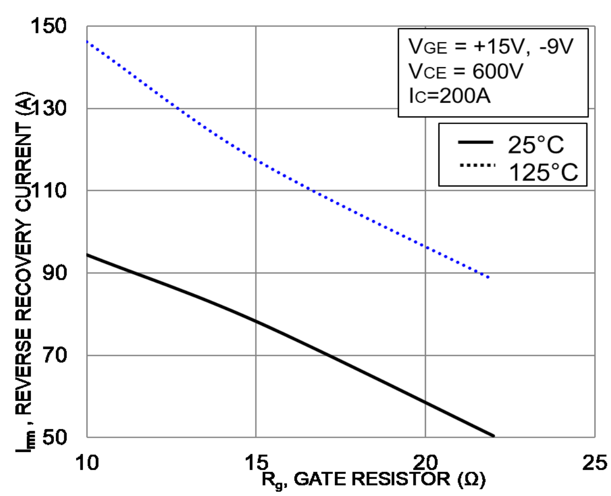


Figure 57. Typical Reverse Recovery Peak Current vs. Rg

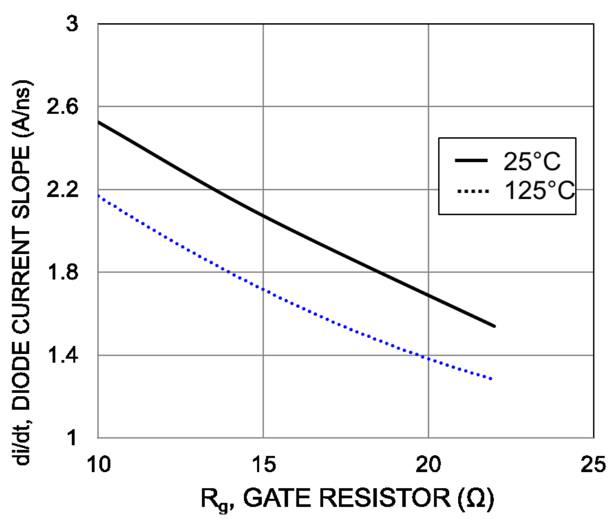


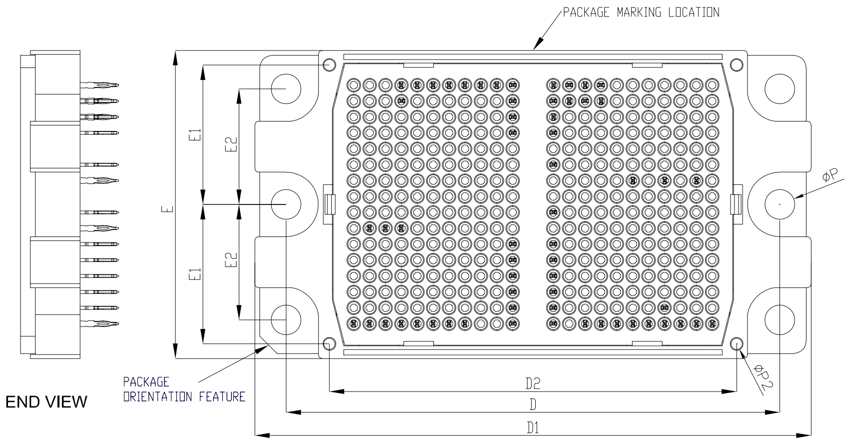
Figure 58. Typical di/dt vs. Rg

ORDERING INFORMATION

Device	Marking	Package	Shipping
NXH600N100L4F5PG	NXH600N100L4F5PG	F5 − PIM52 112x62 (PRESSFIT PIN) (Pb−Free and Halide−Free, Press Fit Pins)	8 Units / Blister Tray
NXH600N100L4F5SG	NXH600N100L4F5SG	F5 − PIM60 112x62x12.3 (SOLDER PIN) (Pb−Free and Halide−Free, Solder Pins)	8 Units / Blister Tray

PACKAGE DIMENSIONS

PIM52 112.00x62.00x19.70
CASE 180HK
ISSUE D



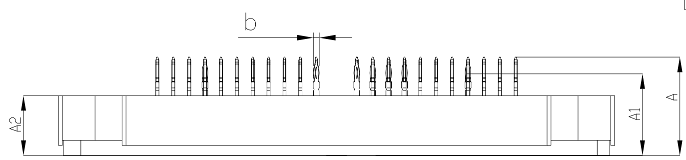
END VIEW

TOP VIEW

NOTES:

1. CONTROLLING DIMENSION : MILLIMETERS
2. PIN POSITION TOLERANCE IS ± 0.4mm
3. PACKAGE MARKING IS LOCATED AS SHOWN ON THE SIDE OPPOSITE THE PACKAGE ORIENTATION FEATURES
4. PRESS-FIT PIN

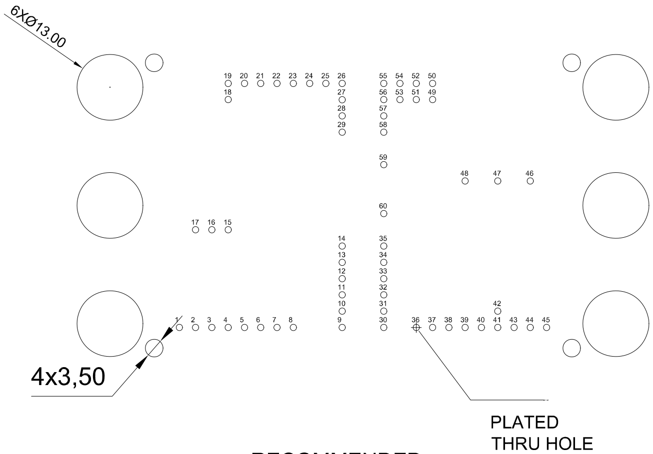
	MILLIMETERS		
DIM	MIN.	NOM.	MAX.
A	19.3	19.7	20.1
A1	16.35	16.55	16.75
A2	11.7	12.0	12.3
b	1.15	1.2	1.25
D	99.3	99.4	99.5
D1	111.6	112.0	112.40
D2	81.8	82.0	82.2
E	61.60	62.00	62.40
E1	27.65	28.05	28.45
E2	23.15	23.25	23.35
P	5.9	6.0	6.1
P2	2.20	2.30	2.40



SIDE VIEW

PACKAGE DIMENSIONS

PIM52 112.00x62.00x19.70
CASE 180HK
ISSUE D



RECOMMENDED
MOUNTING PATTERN

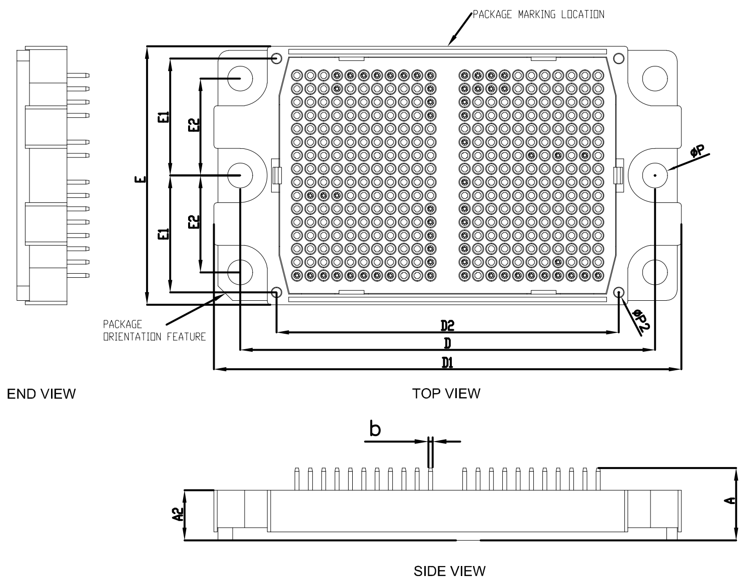
* For additional Information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NOTE 4

PIN	PIN POSITION X	Y	PIN	PIN POSITION X	Y
1	0.00	0.00	31	40.16	3.20
2	3.20	0.00	32	40.16	6.40
3	6.40	0.00	33	40.16	9.60
4	9.60	0.00	34	40.16	12.80
5	12.80	0.00	35	40.16	16.00
6	16.00	0.00	36	46.56	0.00
7	19.20	0.00	37	49.76	0.00
8	22.40	0.00	38	52.96	0.00
9	32.00	0.00	39	56.16	0.00
10	32.00	3.20	40	59.36	0.00
11	32.00	6.40	41	62.56	0.00
12	32.00	9.60	42	62.56	3.20
13	32.00	12.80	43	65.76	0.00
14	32.00	16.00	44	68.96	0.00
15	9.60	19.20	45	72.16	0.00
16	6.40	19.20	46	68.96	28.80
17	3.20	19.20	47	62.56	28.80
18	9.60	44.80	48	56.16	28.80
19	9.60	48.00	49	49.76	44.80
20	12.80	48.00	50	49.76	48.00
21	16.00	48.00	51	46.56	44.80
22	19.20	48.00	52	46.56	48.00
23	22.40	48.00	53	43.36	44.80
24	25.60	48.00	54	43.36	48.00
25	28.80	48.00	55	40.16	48.00
26	32.00	48.00	56	40.16	44.80
27	32.00	44.80	57	40.16	41.60
28	32.00	41.60	58	40.16	38.40
29	32.00	38.40	59	40.16	32.00
30	40.16	0.00	60	40.16	22.40

PACKAGE DIMENSIONS

PIM60 112.00x62.00x12.30
CASE 180BJ
ISSUE A



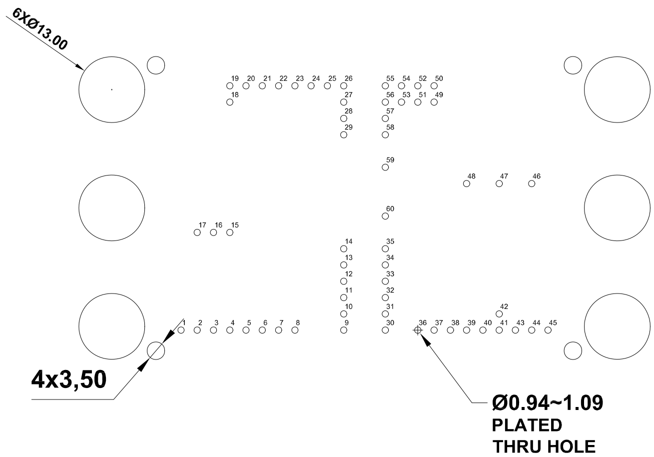
NOTES:

1. **CONTROLLING DIMENSION : MILLIMETERS**
2. **PIN POSITION TOLERANCE IS ± 0.4mm**
3. **PACKAGE MARKING IS LOCATED AS SHOWN ON THE SIDE OPPOSITE THE PACKAGE ORIENTATION FEATURES**
4. **SOLDER PIN**

	MILLIMETERS		
DIM	MIN.	NOM.	MAX.
A	16.9	17.3	17.7
A2	11.7	12.0	12.3
b	0.95	1.0	1.05
D	99.3	99.4	99.5
D1	111.6	112.0	112.40
D2	81.8	82.0	82.2
E	61.60	62.00	62.40
E1	27.65	28.05	28.45
E2	23.15	23.25	23.35
P	5.9	6.0	6.1
P2	2.20	2.30	2.40

PACKAGE DIMENSIONS

PIM60 112.00x62.00x12.30
CASE 180BJ
ISSUE A



RECOMMENDED MOUNTING PATTERN

* For additional Information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NOTE 2:

Pin	X	Y	Pin	X	Y	Pin	X	Y
1	0	0	21	16	48	41	62.56	0
2	3.2	0	22	19.2	48	42	62.56	3.2
3	6.4	0	23	22.4	48	43	65.76	0
4	9.6	0	24	25.6	48	44	68.96	0
5	12.8	0	25	28.8	48	45	72.16	0
6	16	0	26	32	48	46	68.96	28.8
7	19.2	0	27	32	44.8	47	62.56	28.8
8	22.4	0	28	32	41.6	48	56.16	28.8
9	32	0	29	32	38.4	49	49.76	44.8
10	32	3.2	30	40.16	0	50	49.76	48
11	32	6.4	31	40.16	3.2	51	46.56	44.8
12	32	9.6	32	40.16	6.4	52	46.56	48
13	32	12.8	33	40.16	9.6	53	43.36	44.8
14	32	16	34	40.16	12.8	54	43.36	48
15	9.6	19.2	35	40.16	16	55	40.16	48
16	6.4	19.2	36	46.56	0	56	40.16	44.8
17	3.2	19.2	37	49.76	0	57	40.16	41.6
18	9.6	44.8	38	52.96	0	58	40.16	38.4
19	9.6	48	39	56.16	0	59	40.16	32
20	12.8	48	40	59.36	0	60	40.16	22.4

ADDITIONAL INFORMATION