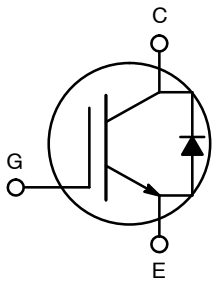
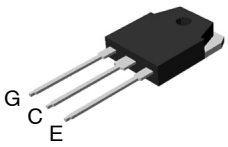
场截止 IGBT

650 V, 40 A

FGA40N65SMD





TO−3P−3LD
CASE 340BZ

概述

安森美 (**onsemi**) 的新型场截止第二代 IGBT 系列产品采用创新型场截止 IGBT 技术，为光伏逆变器、UPS、焊机、感应加热、通信电源、ESS 和 PFC 等低导通和开关损耗至关重要的应用提供最佳性能。

特性

- 最大结温：T_J = 175°C
- 正温度系数，易于并联运行
- 高电流能力
- 低饱和电压：$V_{CE(sat)}$ = 1.9 V (Typ.) @ I_C = 40 A
- 快速开关：E_{OFF} = 6.5 μJ/A
- 紧密的参数分布
- 符合 RoHS 标准

应用

- 光付逆变器、UPS、焊机、PFC、感应加热
- 通信电源、ESS

MARKING DIAGRAM

FGA40N65SMD	= Specific Device Code
A	= Assembly Location
YWW	= Date Code (Year & Week)
ZZ	= Assembly Lot

ORDERING INFORMATION

Device	Package	Shipping
FGA40N65SMD	TO−3P−3LD (Pb−Free)	450 Units / Tube

绝对最大额定值

符号	说明		额定值	单位
V_{CES}	集电极－发射极间电压		650	V
V_{GES}	栅极－发射极间电压		±20	A
	瞬态栅极－发射极间电压		±30	A
I_C	集电极电流	@ T_C = 25°C	80	A
	集电极电流	@ T_C = 100°C	40	A
I_{CM} (注 1)	集电极脉冲电流		120	A
I_F	二极管正向电流	@ T_C = 25°C	40	A
	二极管正向电流	@ T_C = 100°C	20	A
I_{FM} (注 1)	二极管最大正向脉冲电流		120	A
P_D	最大功耗	@ T_C = 25°C	349	W
	最大功耗	@ T_C = 100°C	174	W
T_J	工作结温		−55 至 +175	°C
T_{stg}	存储温度范围		−55 至 +175	°C
T_L	用于焊接的最大引脚温度，距离外壳 1/8″，持续 5 秒		300	°C

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.
(参考译文)
如果电压超过最大额定值表中列出的值范围，器件可能会损坏。如果超过任何这些限值，将无法保证器件功能，可能会导致器件损坏，影响可靠性。
1. 重复额定值：脉宽受最大结温限制

热性能

符号	参数	额定值	单位
$R_{\theta JC}$(IGBT)	结点－壳体的热阻, 最大值	0.43	°C/W
$R_{\theta JC}$(Diode)	结点－壳体的热阻, 最大值	1.5	°C/W
$R_{\theta JA}$	结至环境热阻, 最大值	40	°C/W

二极管电气特性 (T_C = 25°C 除非另有说明)

符号	参数	测试条件		最小值	典型值	最大值	单位
V_{FM}	二极管正向电压	I_F = 20 A	T_C = 25°C	–	2.1	2.6	V
			T_C = 175°C	–	1.7	–	
E_{rec}	反向恢复电能	I_F = 20 A, dI_F/dt = 200 A/μs	T_C = 175°C	–	96	–	μJ
t_{rr}	二极管反向恢复时间		T_C = 25°C	–	42	–	ns
			T_C = 175°C	–	200	–	
I_{rr}	二极管反向恢复峰值电流		T_C = 25°C	–	3.6	–	A
			T_C = 175°C	–	8.0	–	
Q_{rr}	二极管反向恢复电荷		T_C = 25°C	–	76	–	nC
			T_C = 175°C	–	800	–	

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.
(参考译文)
除非另有说明，“电气特性”表格中列出的是所列测试条件下的产品性能参数。如果在不同条件下运行，产品性能可能与“电气特性”表格中所列性能参数不一致。

IGBT 电气特性 (T_C = 25°C 除非另有说明)

符号	参数	测试条件	最小值	典型值	最大值	单位
关断特性						
BV_{CES}	集电极－发射极击穿电压	V_{GE} = 0 V, I_C = 250 μA	650	–	–	V
$\Delta BV_{CES} / \Delta T_J$	击穿温度系数电压	V_{GE} = 0 V, I_C = 250 μA	–	0.6	–	V/°C
I_{CES}	集电极切断电流	V_{CE} = V_{CES}, V_{GE} = 0 V	–	–	250	μA
I_{GES}	G-E 漏电流	V_{GE} = V_{GES}, V_{CE} = 0 V	–	–	±400	nA
导通特性						
$V_{GE(th)}$	G-E 阈值电压	I_C = 250 μA, V_{CE} = V_{GE}	3.5	4.5	6.0	V
$V_{CE(sat)}$	集电极－发射极间饱和电压	I_C = 40 A, V_{GE} = 15 V	–	1.9	2.5	V
		I_C = 40 A, V_{GE} = 15 V, T_C = 175°C	–	2.1	–	V
动态特性						
C_{ies}	输入电容	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	–	1880	–	pF
C_{oes}	输出电容		–	180	–	pF
C_{res}	反向传输电容		–	50	–	pF
开关特性						
$t_{d(on)}$	导通延迟时间	V_{CC} = 400 V, I_C = 40 A, R_G = 6 Ω, V_{GE} = 15 V, 感性负载, T_C = 25°C	–	12	16	ns
t_r	上升时间		–	20	28	ns
$t_{d(off)}$	关断延迟时间		–	92	120	ns
t_f	下降时间		–	13	17	ns
E_{on}	导通开关损耗		–	0.82	1.23	mJ
E_{off}	关断开关损耗		–	0.26	0.34	mJ
E_{ts}	总开关损耗		–	1.08	1.57	mJ
$t_{d(on)}$	导通延迟时间	V_{CC} = 400 V, I_C = 40 A, R_G = 6 Ω, V_{GE} = 15 V, 感性负载, T_C = 175°C	–	15	–	ns
t_r	上升时间		–	22	–	ns
$t_{d(off)}$	关断延迟时间		–	116	–	ns
t_f	下降时间		–	16	–	ns
E_{on}	导通开关损耗		–	1.08	–	mJ
E_{off}	关断开关损耗		–	0.60	–	mJ
E_{ts}	总开关损耗		–	1.68	–	mJ
Q_g	T总栅极电荷	V_{CE} = 400 V, I_C = 40 A, V_{GE} = 15 V	–	119	180	nC
Q_{ge}	栅极－发射极间电荷		–	13	20	nC
Q_{gc}	栅极－集电极间电荷		–	58	90	nC

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.
(参考译文)
除非另有说明，“电气特性”表格中列出的是所列测试条件下的产品性能参数。如果在不同条件下运行，产品性能可能与“电气特性”表格中所列性能参数不一致。

典型性能特征

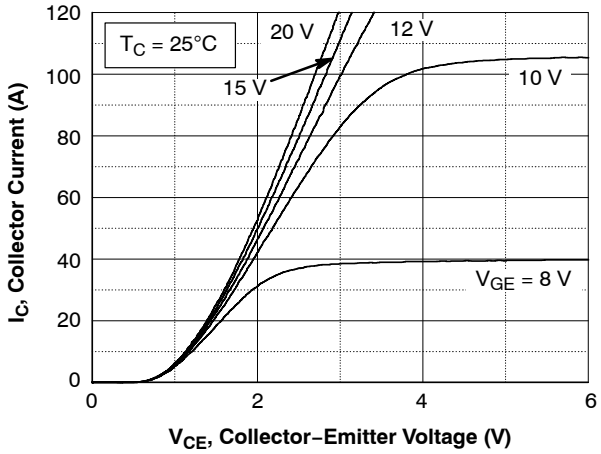


图 1. 典型输出特性

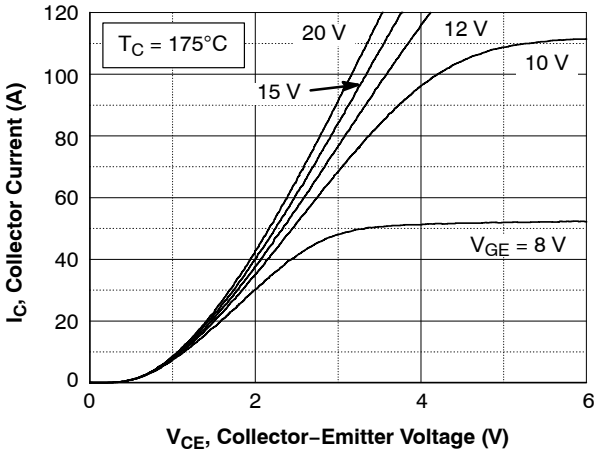


图 2. 典型输出特性

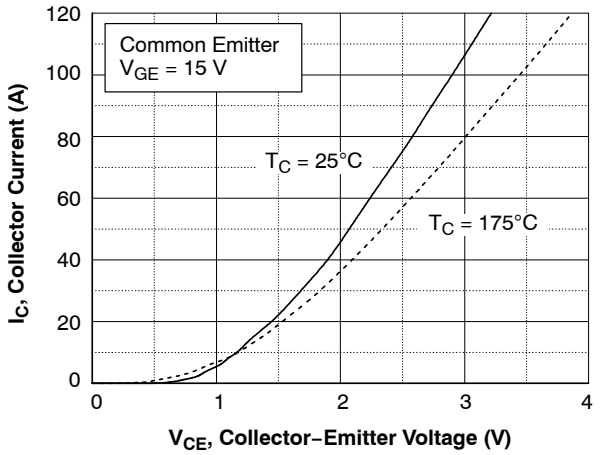


图 3. 饱和电压特性

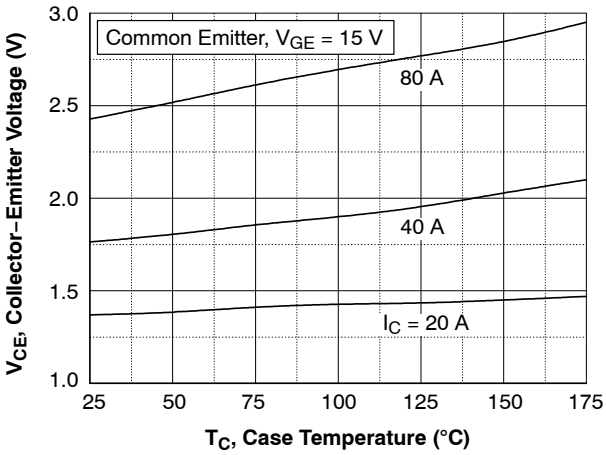


图 4. 饱和电压与可变电流强度下壳温的关系

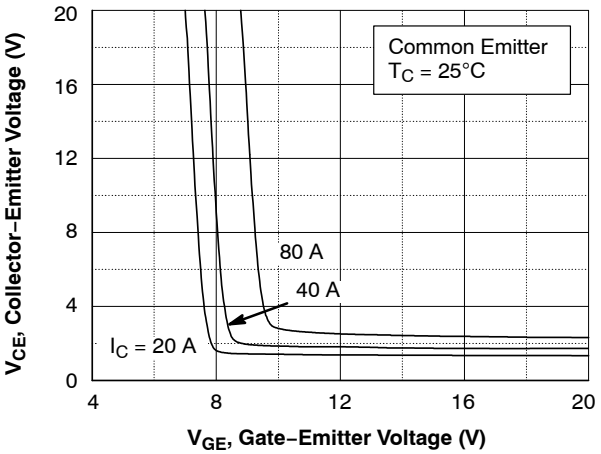


图 5. 饱和电压与 V_{GE} 的关系

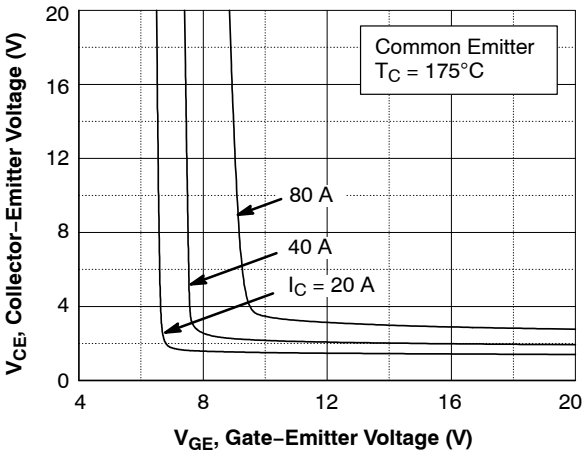


图 6. 饱和电压与 V_{GE} 的关系

典型性能特征

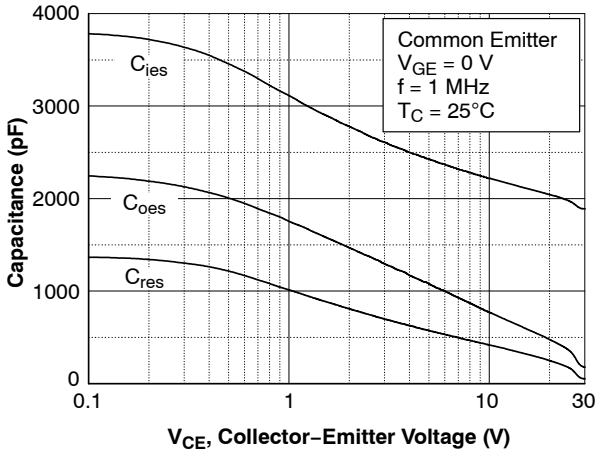


图 7. 电容特性

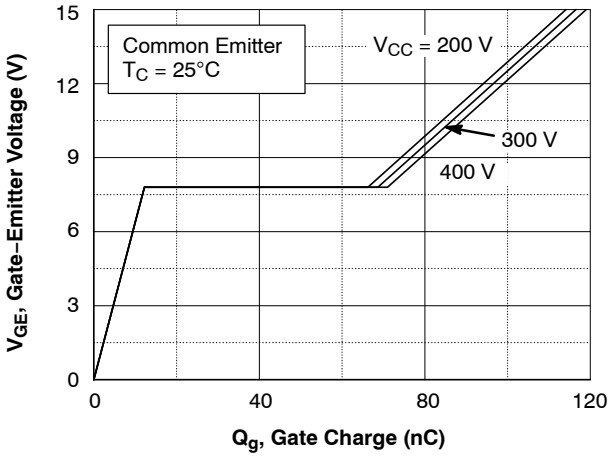


图 8. 栅极电荷特性

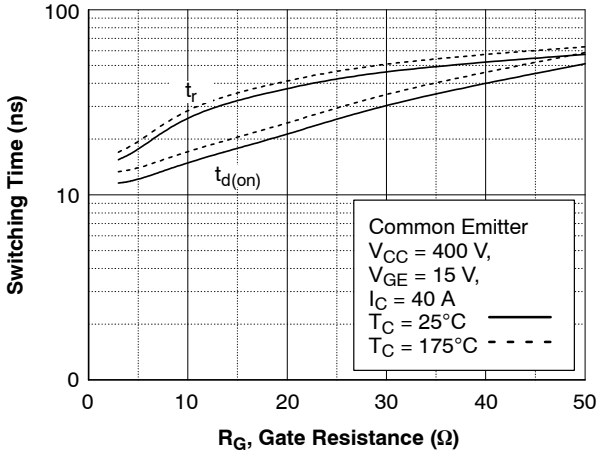


图 9. 导通特性与栅极电阻的关系

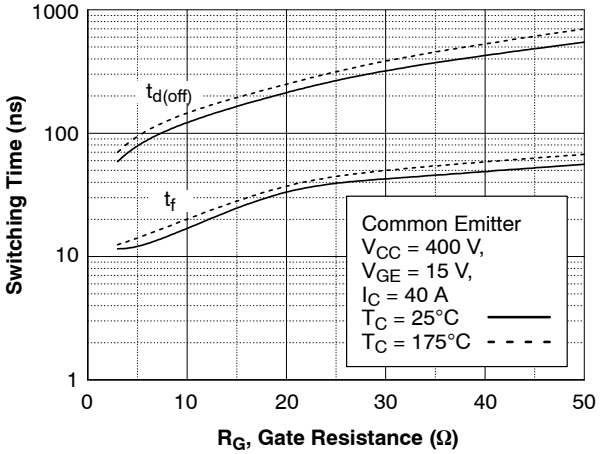


图 10. 关断特性与栅极电阻的关系

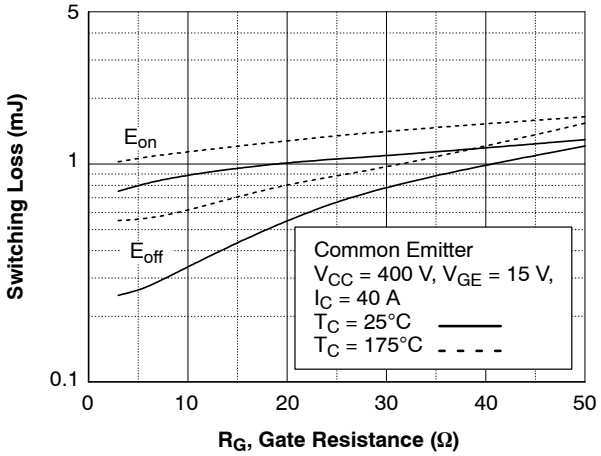


图 11. 开关损耗与栅极电阻的关系

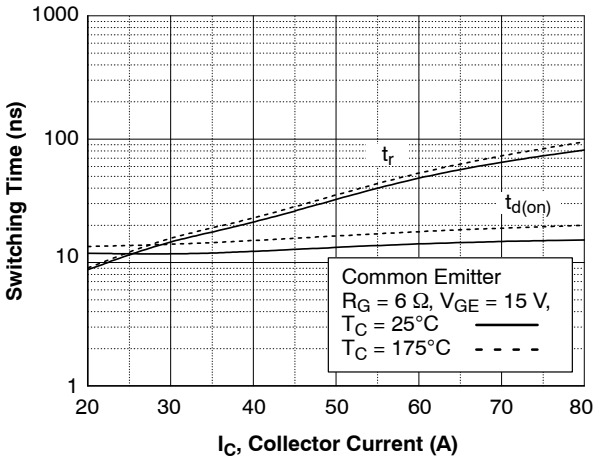


图 12. 导通特性与集电极电流的关系

典型性能特征

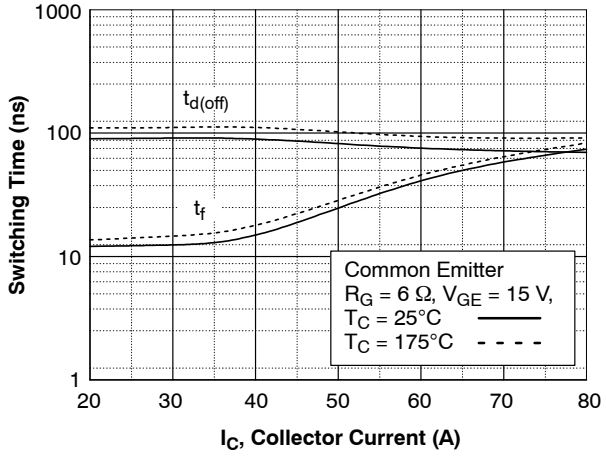


图 13. 关断特性与集电极电流的关系

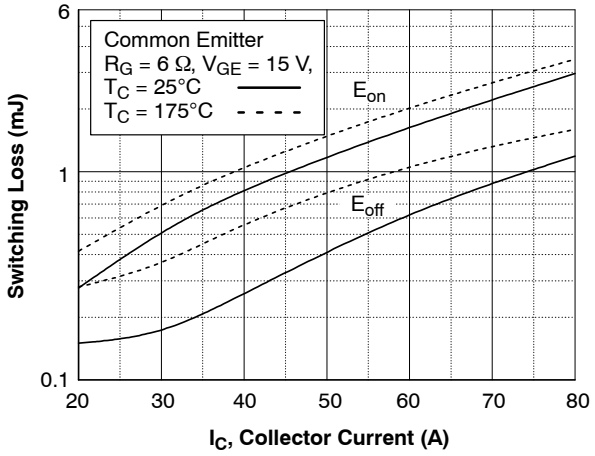


图 14. 开关损耗与集电极电流的关系

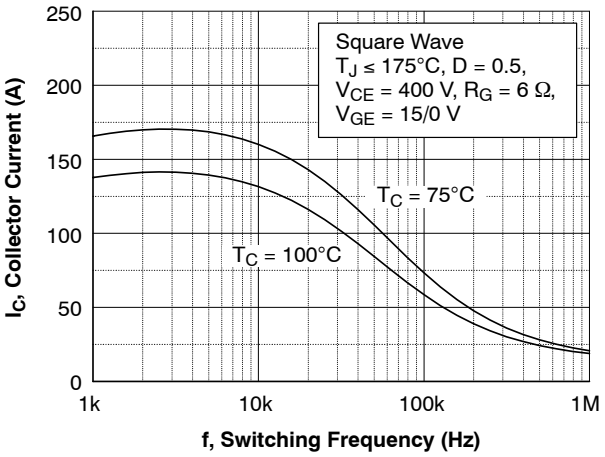


图 15. 负载电流与频率的关系

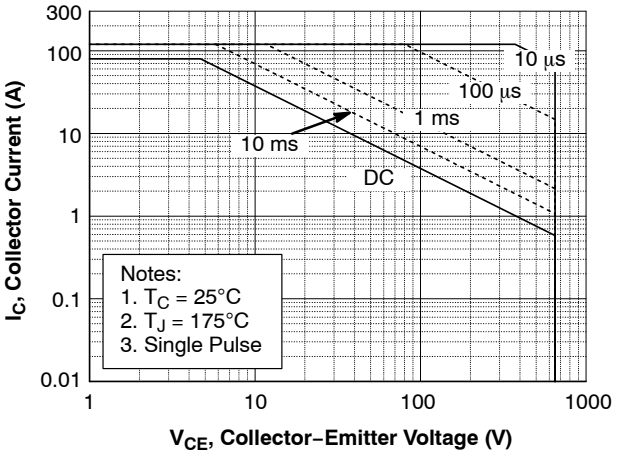


图 16. SOA 特性

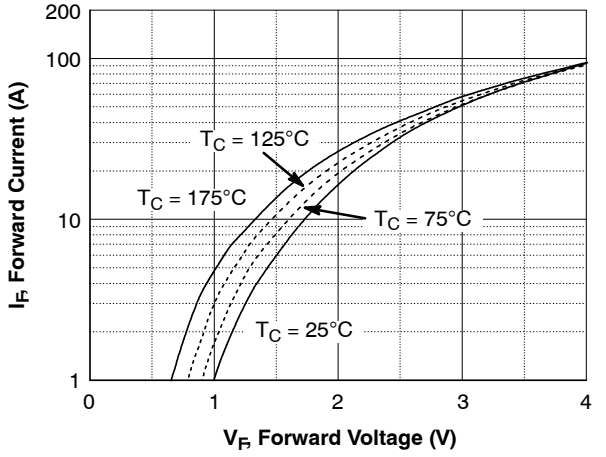


图 17. 正向特性

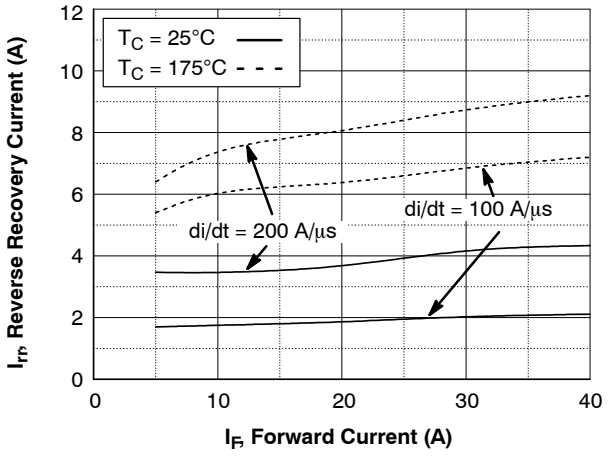


图 18. 反向恢复电流

典型性能特征

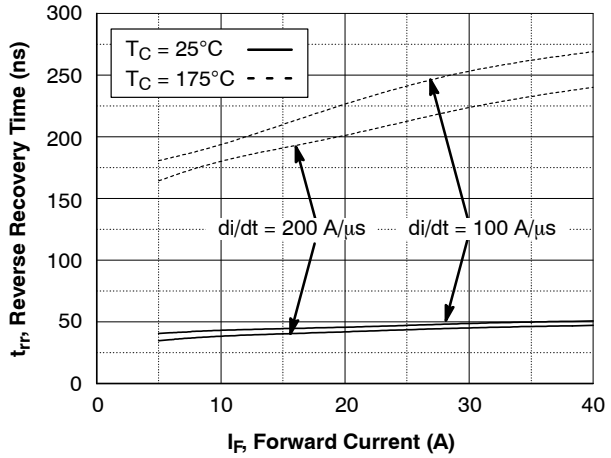


图 19. 反向恢复时间

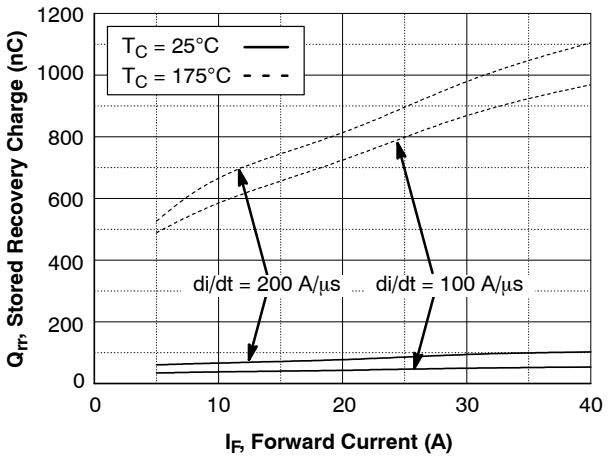


图 20. 存储电荷

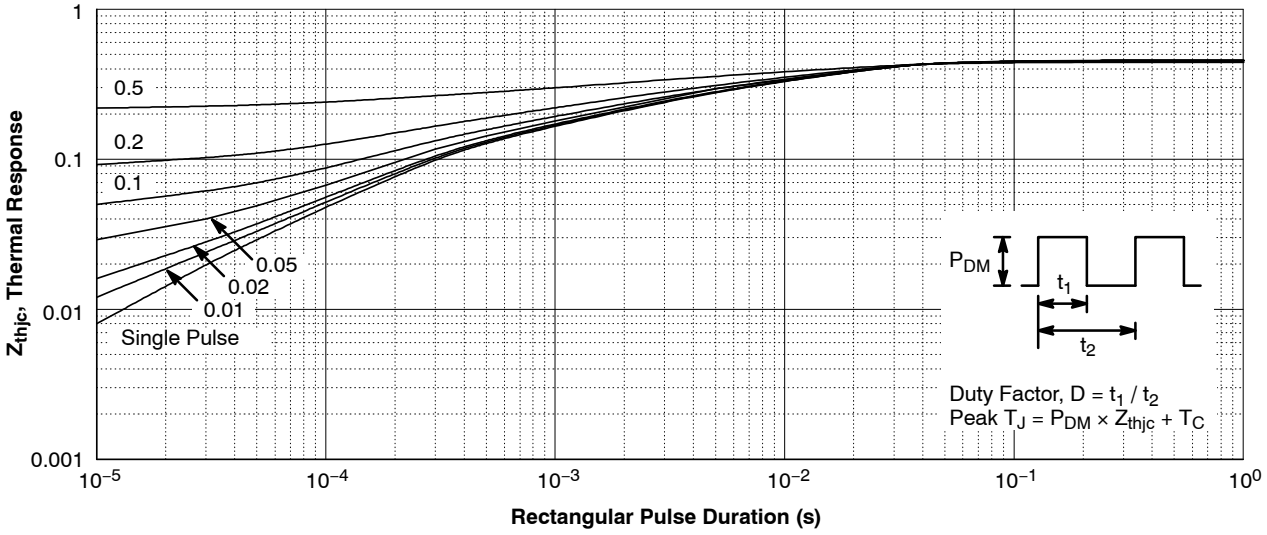


图 21. IGBT 的瞬态热阻

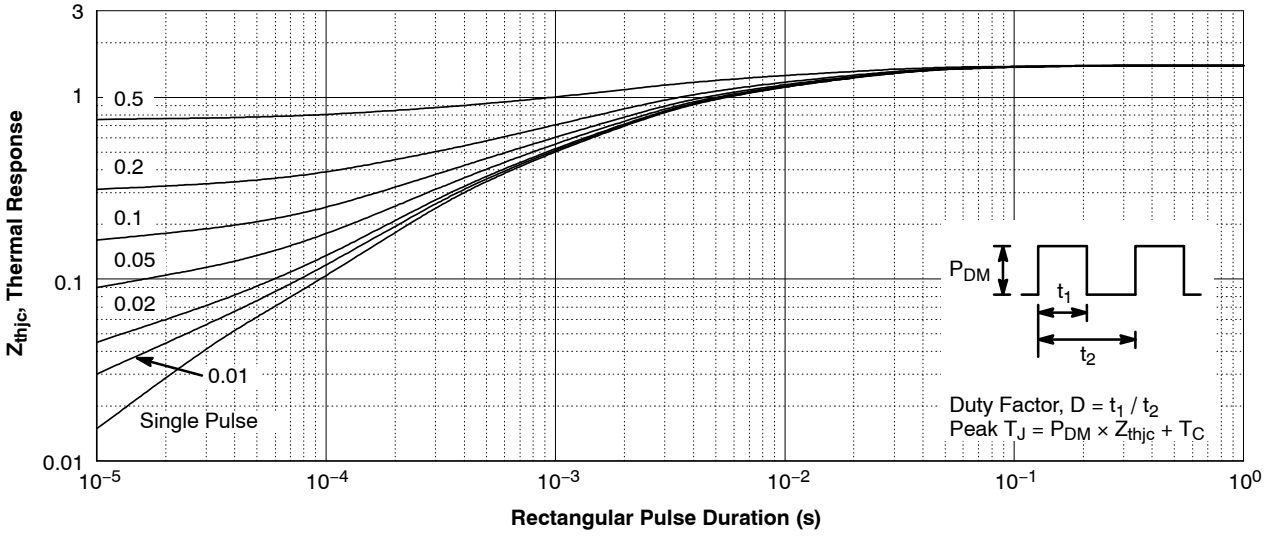
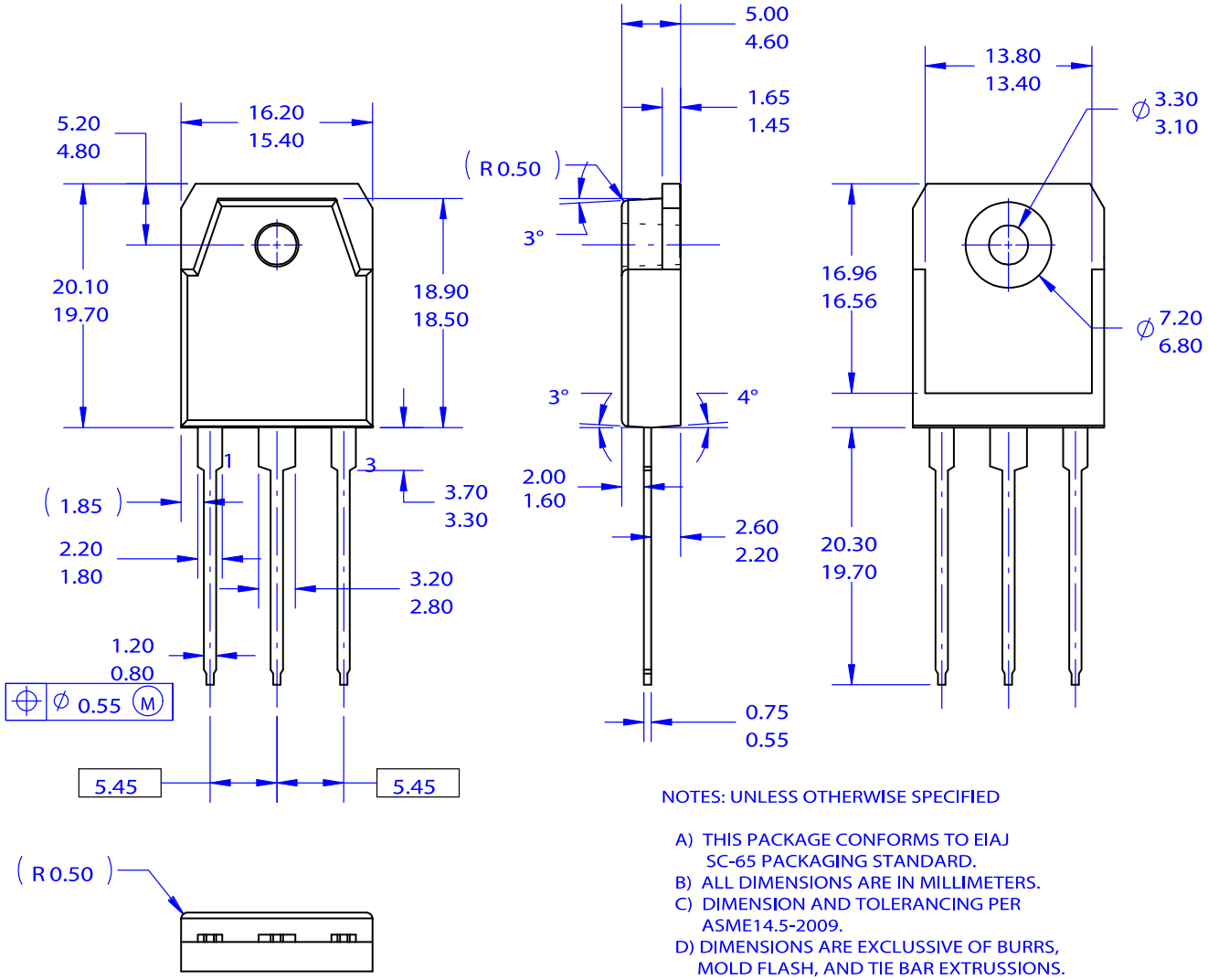


图 22. 二极管瞬态热阻抗

TO−3P−3LD / EIAJ SC−65, ISOLATED
CASE 340BZ
ISSUE O

DATE 31 OCT 2016



NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO EIAJ SC-65 PACKAGING STANDARD.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSION AND TOLERANCING PER ASME14.5-2009.
D) DIMENSIONS ARE EXCLUSSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSSIONS.

DOCUMENT NUMBER:	**98AON13862G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	**TO−3P−3LD / EIAJ SC−65, ISOLATED**		**PAGE 1 OF 1**

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales