

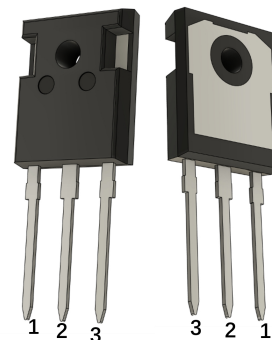


HE40R065Q4DHS

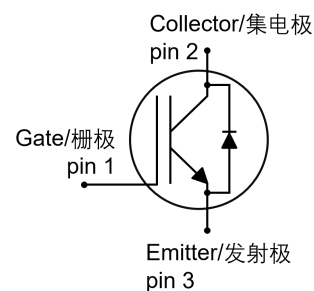
High Performance Field Stop IGBT Power Transistor

Product features/产品特点

- Internal Electrical Isolation
内部电气隔离
- Eliminates the need for external isolation hardware (mica/silicone pads)
无需外部绝缘垫片与绝缘粒, 简化系统装配工艺
- Advanced Trench+FS IGBT technology
先进的沟槽栅+场截止技术
- Low conduction loss
低导通损耗
- Short Circuit Rated
具备短路耐受能力 / 经短路额定测试
- Fast switching
快速开关
- Maximum junction temperature: $T_{vj,MAX}=175^{\circ}\text{C}$
最高结温 $T_{vj,MAX}=175^{\circ}\text{C}$
- Halogen free, RoHS compliant
无卤, 符合RoHS



Fully isolated package TO247IS-3L



Applications/应用领域

- UPS (Uninterruptible Power Supplies)
不间断电源 (UPS)
- Intervers
逆变器
- Motor drivers
电机驱动器

Key performance parameters/关键性能参数

Parameter/参数	Value/值	Unit/单位
V_{CE}	650	V
I_C	40	A
$V_{CEsat,typ}$	1.6	V



Package parameters/封装信息

Type/型号	Package/封装	Marking/标识	Packaging method/包装方式
HE40R065Q4DHS	TO247IS-3L(内绝缘)	HE40R065DHS	Tube/管装

HE40R065Q4DHS

High performance field stop IGBT power transistor



1. Maximum ratings at $T_{vj}=25^{\circ}\text{C}$, unless otherwise specified.

最大额定值 默认 $T_{vj}=25^{\circ}\text{C}$ 除非另有说明

Table 1 Characteristic values/特征值

Parameter 参数	Symbol 符号	Test condition 测试条件	Value 值	Unit 单位
Collector-to-emitter voltage 集电极-发射极电压	V_{CE}	$T_{vj}\geq 25^{\circ}\text{C}$	650	V
DC Collector current 集电极连续直流电流	I_C^1	$T_C=25^{\circ}\text{C}$	80	A
		$T_C=100^{\circ}\text{C}$	40	
Pulsed Collector current 集电极脉冲电流	I_{Cpuls}^2		120	A
Turn off safe operating area 关断安全工作区	— ²	$V_{CE}\leq 650\text{V}, T_{vj}\leq 175^{\circ}\text{C}$	120	A
Diode continuous forward current 二极管连续直流电流	I_F^1	$T_C=25^{\circ}\text{C}$	80	A
		$T_C=100^{\circ}\text{C}$	40	
Diode pulsed current 二极管脉冲电流	I_{Fpuls}^2		120	A
Gate-emitter voltage 栅极-发射极峰值电压	V_{GE}		± 20	V
Transient gate-emitter voltage 瞬态栅极-发射极电压	V_{GE}	$t_p\leq 10\mu\text{s}, D<0.01$	± 30	V
Short circuit withstand time 短路耐量	t_{sc}	$V_{GE}=15\text{V}, V_{CC}\leq 400\text{V}$	5	μs
Power dissipation 总耗散功率	P_{tot}	$T_C=25^{\circ}\text{C}$	183	W
		$T_C=100^{\circ}\text{C}$	91	
Mounting torque 安装扭矩	M_d	M3 and M3.5 screw M3或者M3.5螺钉	0.6	Nm

1. Limited by $T_{vj}(\text{max})$ /受限于最高结温

2. Pulse width t_p limited by $T_{vj}(\text{max})$ /脉宽受限于最大结温



2. Package 封装

Table 2 Characteristic values/特征值

Parameter 参数	Symbol 符号	Test condition 测试条件	Value/值			Unit 单位
			Min.	Typ.	Max.	
Operating Junction Temperature 可工作结温	T_{vj}		-55		175	°C
Storage Temperature Range 储存温度	T_{stg}		-55		175	°C
Soldering temperature 焊接温度	T_{sold}				260	°C
IGBT thermal resistance, junction-to-case IGBT 芯片到壳热阻	$R_{th(j-C)}$				0.82	°C/W
Diode thermal resistance, junction-to-case 二极管芯片到壳热阻	$R_{th-(j-C)}$				1.15	°C/W
Thermal resistance, junction-to-ambient 结到环境热阻	$R_{th(j-A)}$				61	°C/W

HE40R065Q4DHS

High performance field stop IGBT power transistor



3. Static electrical characteristic at $T_{vj}=25^{\circ}\text{C}$, unless otherwise specified.

静态电气特性 默认 $T_{vj}=25^{\circ}\text{C}$ 除非另有说明

Table 3 Characteristic values/特征值

Parameter 参数	Symbol 符号	Test condition 测试条件	Value/值			Units 单位
			Min.	Typ.	Max.	
Collector - Emitter breakdown voltage 集电极-发射极击穿电压	$V_{(BR)CES}$	$V_{GE}=0V, I_C=1mA$	650			V
Collector-Emitter Saturation voltage 集电极-发射极饱和压降	V_{CEsat}	$V_{GE}=15V, I_C=40A$		1.6	2.0	V
		$T_{vj}=175^{\circ}\text{C}$		2.1		
Gate threshold voltage 门极开启阈值电压	V_{GEth}	$V_{GE}=V_{CE}, I_C=1mA$	5.0	5.8	7.0	V
Diode Forward Voltage 二极管正向导通压降	V_F	$V_{GE}=0V, I_F=40A$		1.7	2.2	V
		$T_{vj}=175^{\circ}\text{C}$		1.5		
Gate to Emitter Leakage current 门极-发射极漏电流	I_{GES}	$V_{GE}=30V, V_{CE}=0V$			200	nA
		$V_{GE}=-30V, V_{CE}=0V$			-200	
Zero gate voltage collector current 集电极-发射极漏电流	I_{CES}	$V_{CE}=650V, V_{GE}=0V$			100	μA
Integrated gate resistor 内部门极电阻	R_G	$f=1MHz$		1.2		Ω

4. Dynamic electrical characteristic at $T_{vj}=25^{\circ}\text{C}$, unless otherwise specified.

动态电气特性 默认 $T_{vj}=25^{\circ}\text{C}$ 除非另有说明

Table 4 Characteristic values/特征值

Parameter 参数	Symbol 符号	Test condition 测试条件	Value/值			Units 单位
			Min.	Typ.	Max.	
Input capacitance 输入电容	C_{ies}	$V_{GE}=0V, V_{CE}=25V,$ $f=1MHz$		1910		pF
Output capacitance 输出电容	C_{oes}			80		
Reverse transfer capacitance 反向传输电容	C_{res}			13		
Total gate charge 门极电荷	Q_g	$V_{GE}=0/15V,$ $I_C=40A, V_{CC}=520V$		107		nC



5. Switching characteristic inductive load at $T_{vj}=25^{\circ}\text{C}$, unless otherwise specified.

开关特性感性负载 默认 $T_{vj}=25^{\circ}\text{C}$ 除非另有说明

Table 5 IGBT Characteristic values/IGBT特征值

Parameter 参数	Symbol 符号	Test condition 测试条件		Value/值			Units 单位
				Min.	Typ.	Max.	
Turn-on delay time 开启延迟时间	t _{d(on)}	V _{GE} =0/15V V _{CC} =400V I _C =40A R _{G(on)} =4Ω R _{G(off)} =4Ω	T _{vj} =25°C		21		ns
			T _{vj} =175°C		21		
Rise time 上升时间	t _r		T _{vj} =25°C		23		ns
			T _{vj} =175°C		37		
Turn-off delay time 关闭延迟时间	t _{d(off)}		T _{vj} =25°C		99		ns
			T _{vj} =175°C		134		
Fall time 下降时间	t _f		T _{vj} =25°C		27		ns
			T _{vj} =175°C		60		
Turn-on switch loss 单次开启损耗	E _{on}		T _{vj} =25°C		0.96		mJ
			T _{vj} =175°C		1.32		
Turn-off switch loss 单次关闭损耗	E _{off}		T _{vj} =25°C		0.54		mJ
			T _{vj} =175°C		0.89		
Total switching energy 总开关损耗	E _{ts}		T _{vj} =25°C		1.50		mJ
			T _{vj} =175°C		2.21		

Table 6 Diode Characteristic values/二极管特征值

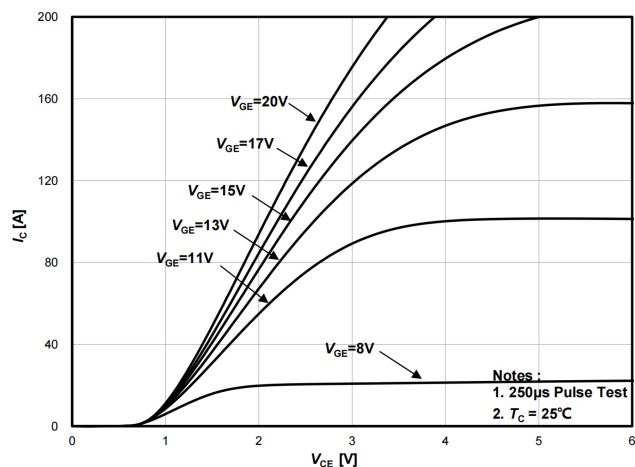
Parameter 参数	Symbol 符号	Test condition 测试条件		Value/值			Units 单位
				Min.	Typ.	Max.	
Diode Reverse Recovery Time 二极管反向恢复时间	t _{rr}	V _R =400V I _F =40A di _F /dt=-200A/μs	T _{vj} =25°C		125		ns
			T _{vj} =175°C		252		
Diode Reverse Recovery Charge 二极管反向恢复电量	Q _{rr}		T _{vj} =25°C		0.16		μC
			T _{vj} =175°C		1.51		
Peak reverse recovery current 反向恢复峰值电流	I _{rrm}		T _{vj} =25°C		3.5		A
			T _{vj} =175°C		10.0		



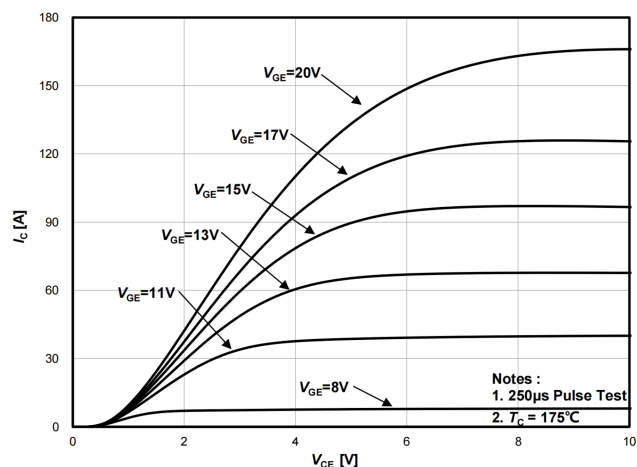
6. Characteristics diagrams

特性曲线

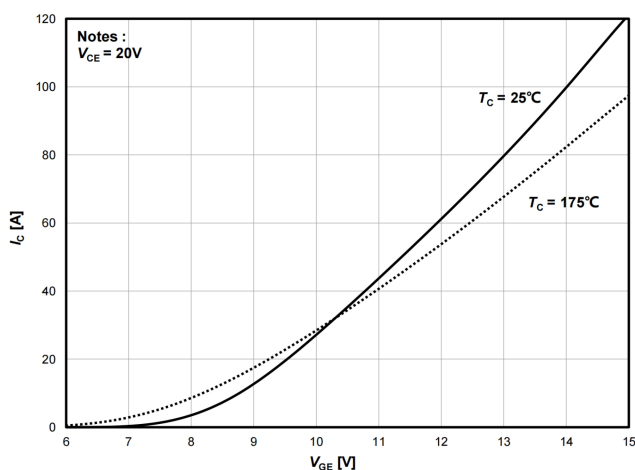
Typ. Output characteristic/输出特性



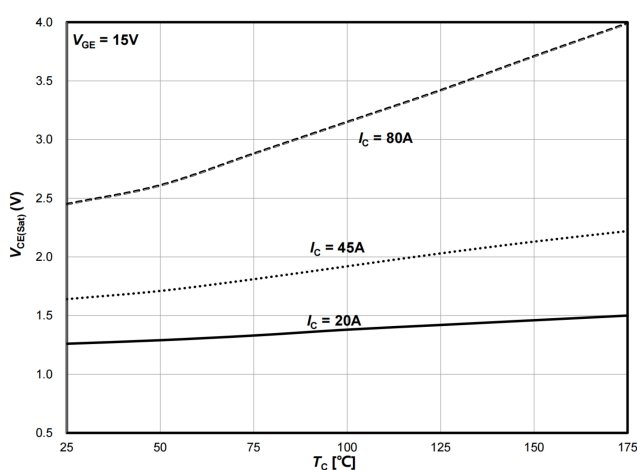
Typ. Output characteristic/输出特性



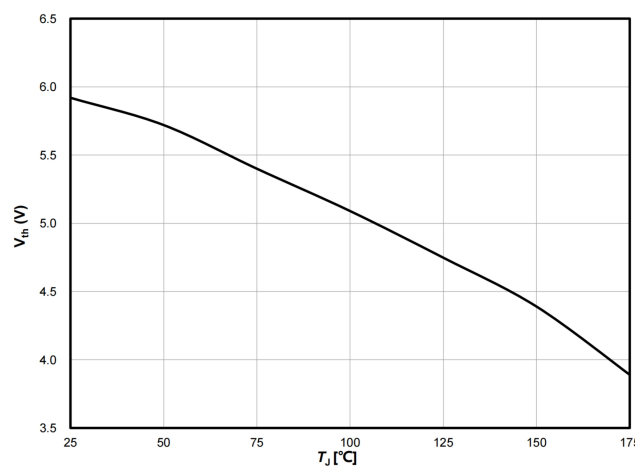
Typ. Transfer characteristic/典型传输特性



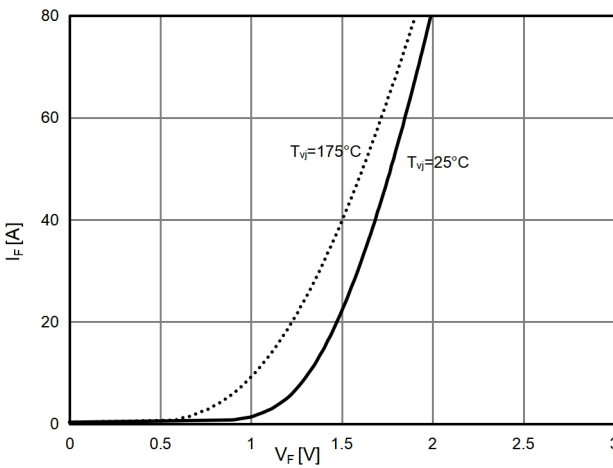
Typ. Temperature dependence of V_{CEsat} /饱和压降与结温特性



Typ. Gate threshold voltage/门级阈值电压结温特性



Typ. Temperature dependence of V_F /二极管压降与结温特性

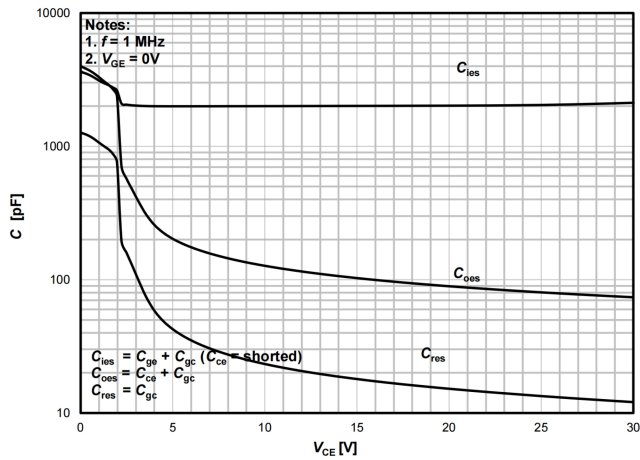


HE40R065Q4DHS

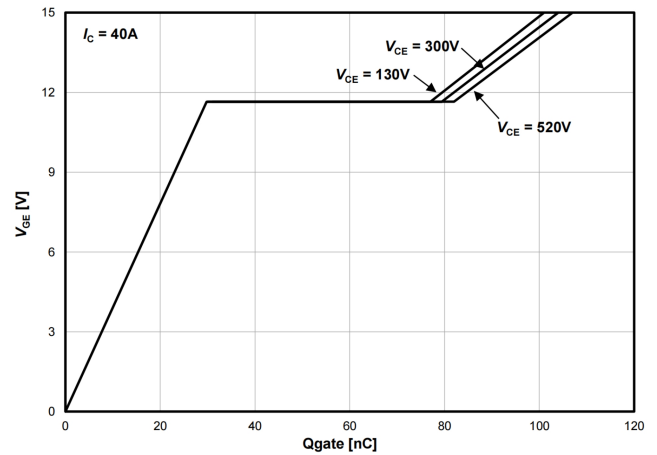
High performance field stop IGBT power transistor



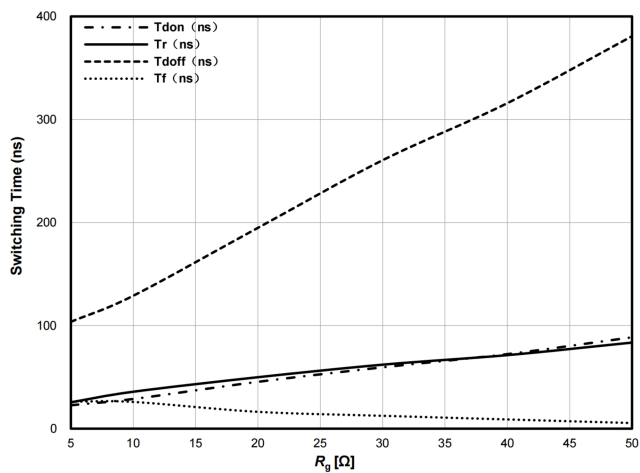
Typ.Capacitances/电容特性



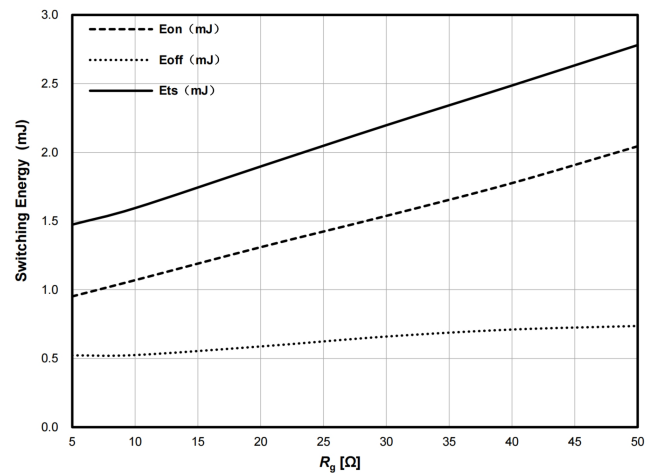
Typ.Gate charge/门级电荷



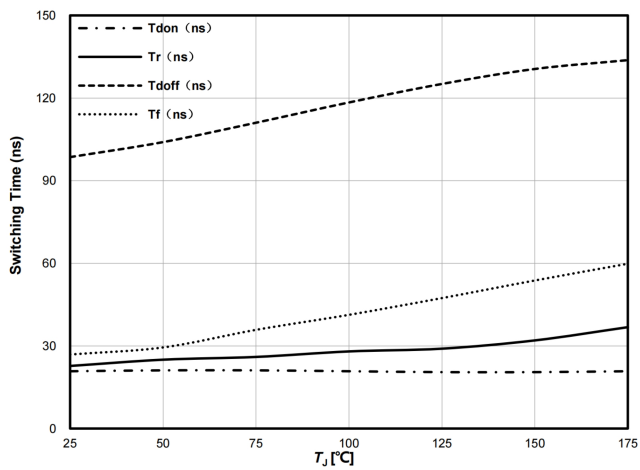
Typ.Switching times vs resistance/开关时间与门级电阻特性



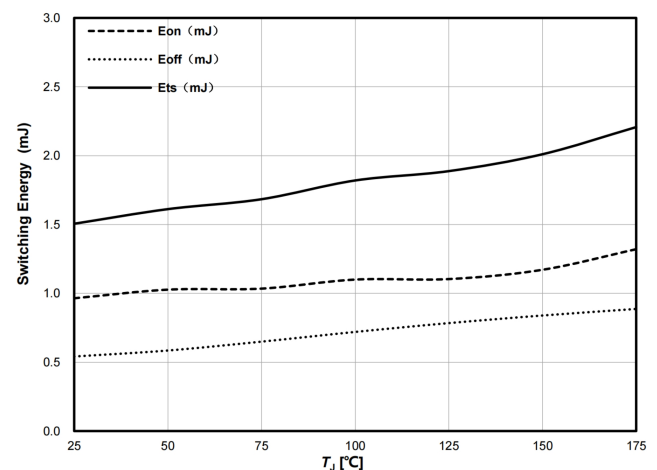
Typ.Switching losses vs resistance/动态损耗与门级电阻特性



Typ.Switching times vs temperature/开关时间与结温特性



Typ.Switching losses vs temperature/动态损耗与结温特性

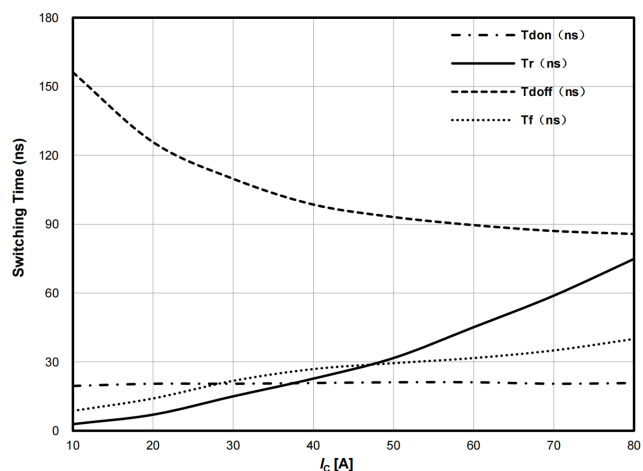


HE40R065Q4DHS

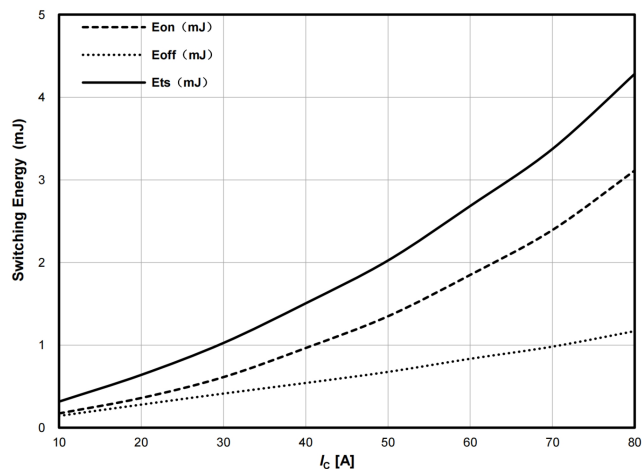
High performance field stop IGBT power transistor



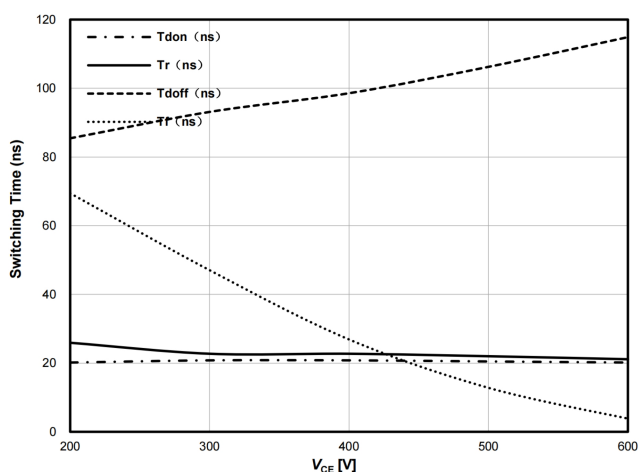
Typ.Switching times vs current/开关时间与电流特性



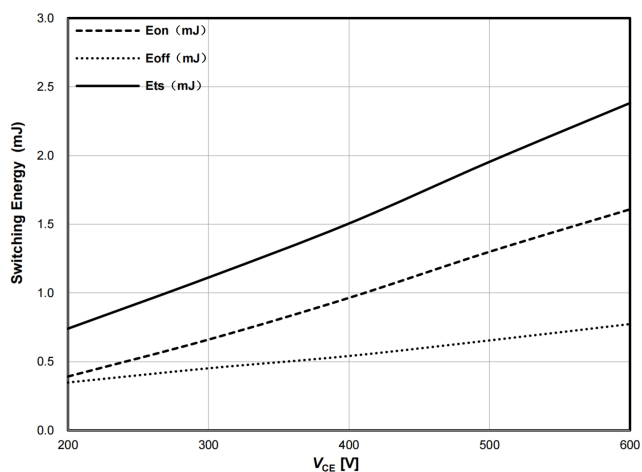
Typ.Switching losses vs current/动态损耗与电流特性



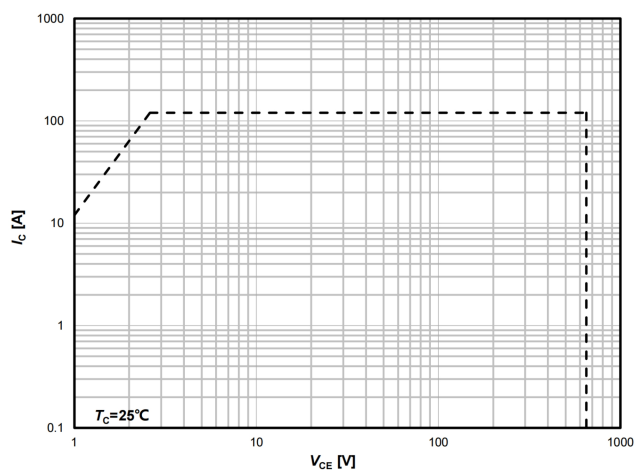
Typ.Switching times vs voltage/开关时间与电压特性



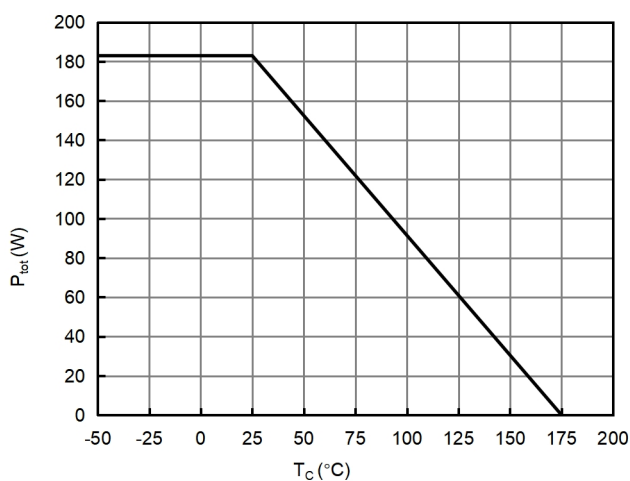
Typ.Switching losses vs voltage/动态损耗与电压特性



Reverse bias safe operating area/反偏安全工作区



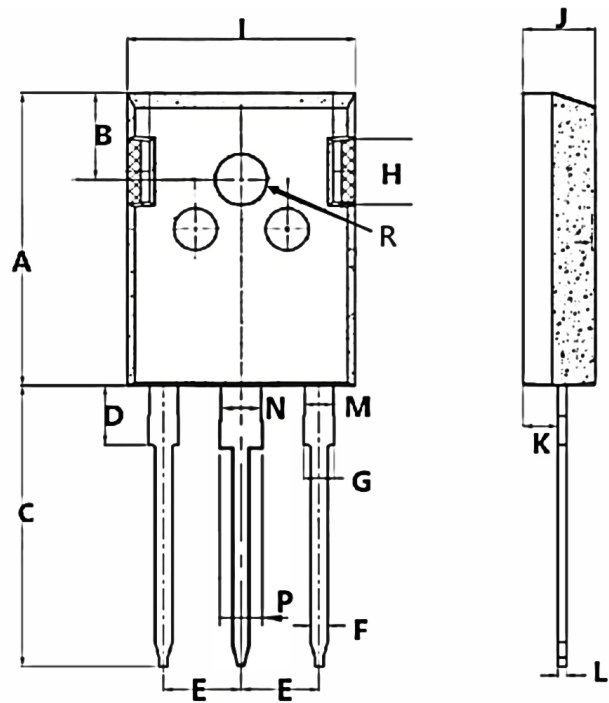
Power dissipation/耗散功率





7. Package outline
封装外形

Figure 1. Outline TO247IS-3L, dimensions in mm/ TO247IS-3L外形尺寸 (毫米)



尺寸标识 (DIM)	最小值 (MIN)	最大值 (MAX)
A	20.45	21.45
B	5.70	6.70
C	19.00	21.00
D	3.50	5.00
E	5.23	5.63
F	1.13	1.27
G	1.90	2.30
H	4.30	5.30
I	15.40	16.40
J	4.90	5.10
K	2.00	3.00
L	0.55	0.65
M	1.92	2.07
N	2.92	3.07
P	2.90	3.30
R	1.63	2.03



8. Revision history
修订历史

Table 7 Date and version number/日期与版本号

Date日期	Revision版本	Changes更改内容
2026-06-09	Rev.G1.0	Target Datasheet (目标规格书)

9. Matters needing attention
注意事项

Table 8 Important Technical Guidance, Application Policy, and Copyright Notice/重要技术指南、应用规范与版权声明

[Data and Design Guidance] The information provided herein, including typical values and application examples, serves as technical guidance only and should not be construed as a formal guarantee of product characteristics. This documentation is intended for qualified engineering personnel, who bear the ultimate responsibility for evaluating the product's suitability for their specific application and compliance with all industry standards.	【数据与设计指引】 本文件中提供的所有信息，包括任何典型值和应用示例，仅作为技术指引，不应被视为对产品特性的正式保证。本资料专供具备资质的工程技术人员使用，客户的技术部门应对产品在特定应用中的适用性和对所有行业标准的符合性负最终评估责任。
[Copyright and Revision Management] We reserve all rights to the intellectual property contained within this document, and unauthorized reproduction is prohibited. For the sake of continuous improvement, the content is subject to change without prior notice. Designers are obligated to consult and use the latest revision of this datasheet to ensure optimal performance and accuracy in their final product.	【版权与版本管理】 本文件的所有知识产权和版权均归我方所有，严禁未经授权的复制与传播。为持续优化产品性能，本文件内容可能随时变更，恕不另行通知。设计人员有义务查阅并使用最新的版本数据手册，以确保设计准确性并实现最佳系统性能。
[Application Safety and Intellectual Property] Our product supply does not confer any license or right under any third-party intellectual property. Customers are fully responsible for the patent clearance and functional safety of their end application. Furthermore, this product is not intended for use in life-critical or high-risk systems (such as Class III medical devices or aerospace control) unless explicitly approved by us through a dedicated high-reliability agreement.	【应用安全与知识产权】 我方提供本产品，不应被视为授予任何第三方知识产权的许可或权利。客户应对其终端应用中的功能安全性、系统鲁棒性以及不侵犯任何第三方专利负全部责任。此外，本产品未被设计或认证用于生命维持或极高风险的关键系统。在将本产品用于此类高可靠性应用之前，客户必须设计充分的冗余和安全机制，并事先与我方签署专门的高可靠性供货协议。

<http://www.hmwsemi.com/>