	DG10N60	版本号: V1.0
	绝缘栅双极型晶体管	

## 产品概述

IGBT既有功率MOSFET输入阻抗高, 控制功率小, 易于驱动, 控制简单的特点, 又有双极晶体管的导通电压低, 通态电流大, 损耗小的显著优点。在提倡节能减排、低碳经济的时代, 具备节能效率高, 便于规模化生产等优点的IGBT已成为功率半导体市场发展的主流技术。

## 产品特点

- 采用NPT技术
- 高开关速度:  $t_f = 110\text{ns}$
- 低饱和压降:  $V_{CE(sat)} = 2.15\text{V} @ I_c=10\text{A}$
- 高输入阻抗
- 热稳定性好

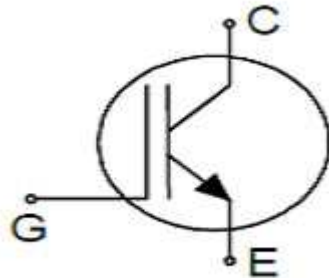
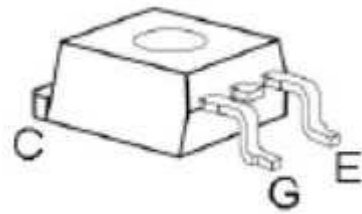
## 应用领域

主要用于小型电焊机。

## 特征参数

符号	额定值	单位
$V_{(BR)CES}$	600	V
$I_c$	10	A
$V_{CE(sat)}$	2.15	V

封装: TO-263



## 极限值

除非另有规定,  $T_a=25^\circ\text{C}$

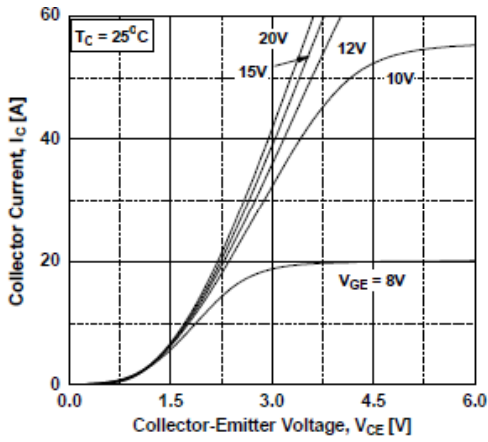
参数名称	符号	额定值	单位
集电极-发射极击穿电压	$V_{CE}$	600	V
连续集电极	$I_c$	10	A
脉冲集电极电流	$I_{cpuls}$	60	A
栅-发射极电压	$V_{GE}$	$\pm 30$	V
耗散功率 $T_c=25^\circ\text{C}$	$P_D$	280	W
工作温度范围	$T_J$	-55 to +150	$^\circ\text{C}$
贮存温度范围	$T_{STG}$	-55 to +150	$^\circ\text{C}$

## 电参数

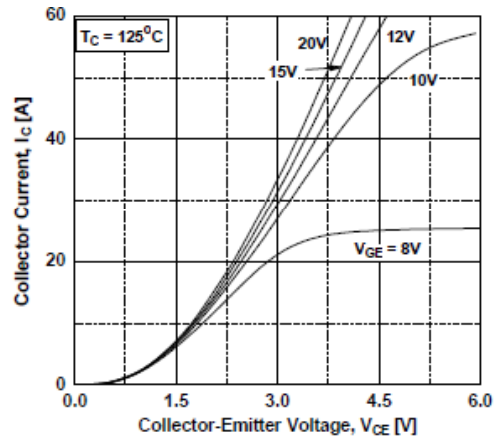
除非另有规定,  $T_a=25^{\circ}\text{C}$

参数名称	符号	测试条件	规范值			单位
			最小	典型	最大	
$V_{(BR)CES}$	集电极-发射极击穿电压	$V_{GE}=0$ $I_C=250\mu\text{A}$	600			V
$I_{CES}$	集电极-发射极泄漏电流	$V_{GE}=0$ $V_{CE}=600\text{V}$			280	$\mu\text{A}$
$I_{GSS}$	栅极-发射极泄漏电流	$V_{CE}=0$ $V_{GE}=20\text{V}$			300	nA
$V_{GE(th)}$	开启电压	$V_{GE}=V_{CE}$ , $I_D=250\mu\text{A}$	4.0		6.0	V
$V_{CE(sat)}$	集电极-发射极饱和压降	$V_{GE}=15\text{V}$ , $I_C=10\text{A}$		2.15	2.5	V
$C_{iss}$	输入电容	$V_{CE}=30\text{V}$ , $V_{GE}=0$ , $f=1\text{MHz}$		1500		pF
$C_{oss}$	输出电容			150		pF
$C_{rss}$	反向恢复电容			50		pF
$Q_g$	栅电荷	$V_{CC}=400\text{V}$ $I_C=10\text{A}$ $V_{GE}=15\text{V}$		105	145	nC
$t_d(on)$	导通延时	$V_{CC}=400\text{V}$ , $I_C=10\text{A}$ , $R_G=10\ \Omega$ 感性负载		30		ns
$t_r$	上升时间			40		ns
$t_d(off)$	关断延时			120		ns
$t_f$	下降时间			100		ns
$E_{on}$	开启能量			0.50		mJ
$E_{off}$	关断能量			1.80		mJ
$t_d(on)$	导通延时		$V_{CC}=400\text{V}$ , $I_C=10\text{A}$ , $R_G=10\ \Omega$ $T_C=150^{\circ}\text{C}$ 感性负载		31	
$t_r$	上升时间			42		ns
$t_d(off)$	关断延时			130		ns
$t_f$	下降时间			115		ns
$E_{on}$	开启能量			0.66		mJ
$E_{off}$	关断能量			2.0		mJ

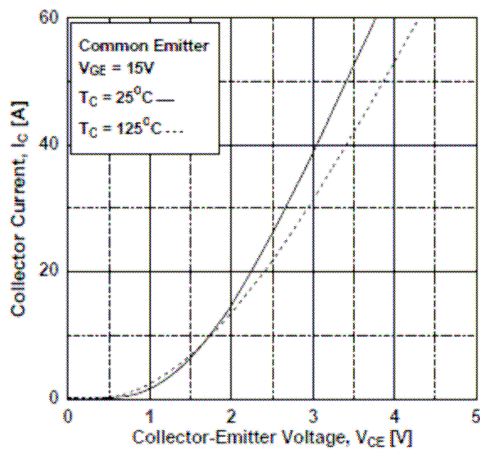
## 典型特性



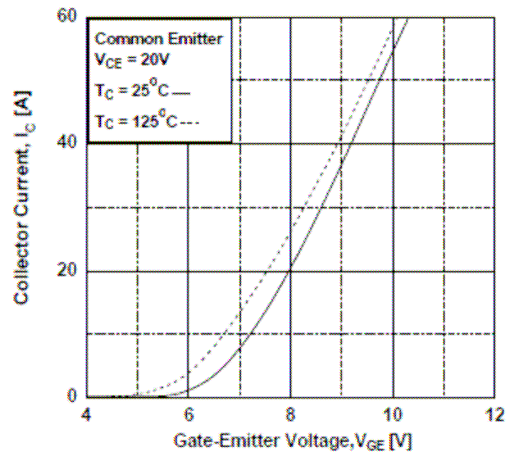
典型输出特性曲线 (T=25°C)



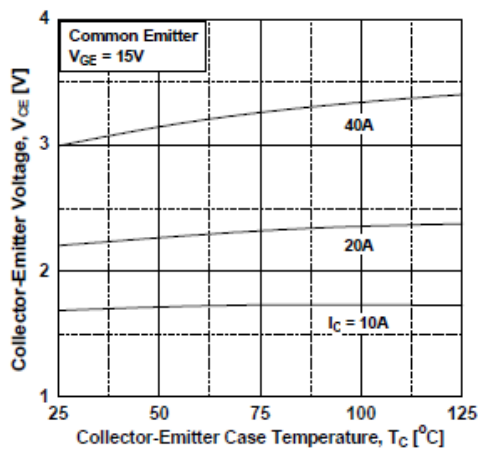
典型输出特性曲线 (T=125°C)



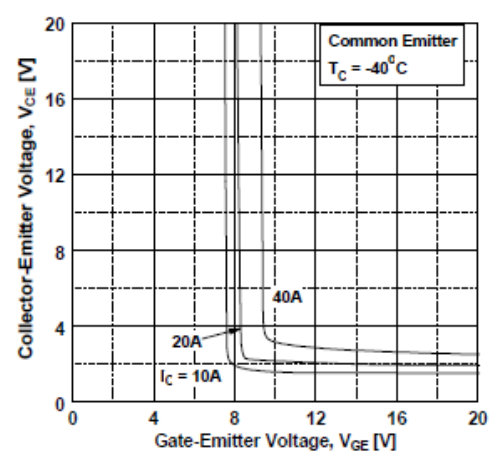
饱和压降特性曲线



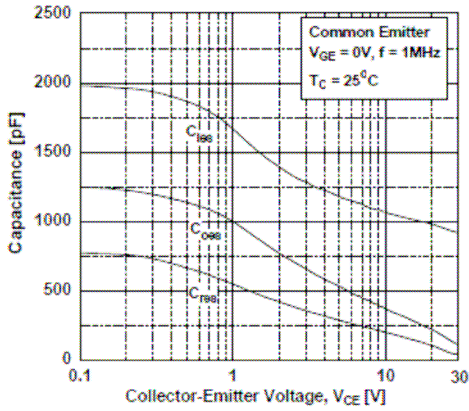
转移特性曲线



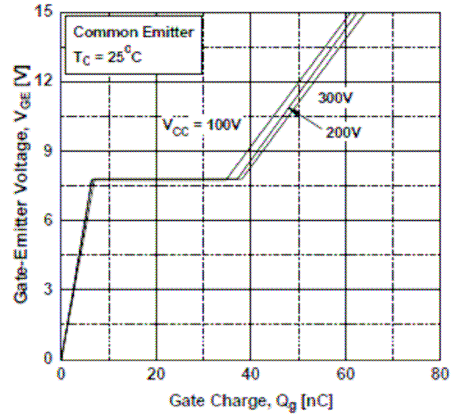
集电极-发射极饱和压降与管壳温度的关系曲线



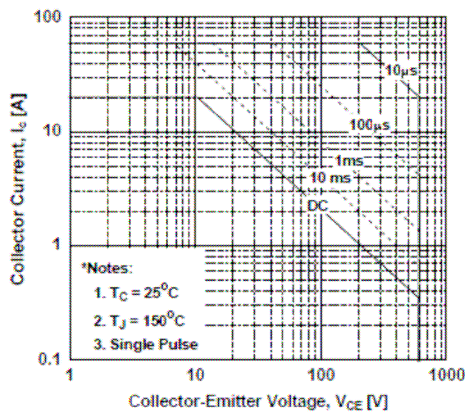
集电极-发射极饱和压降与  $V_{GE}$  关系



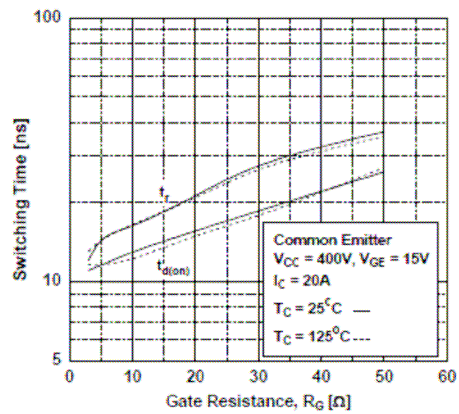
电容特性



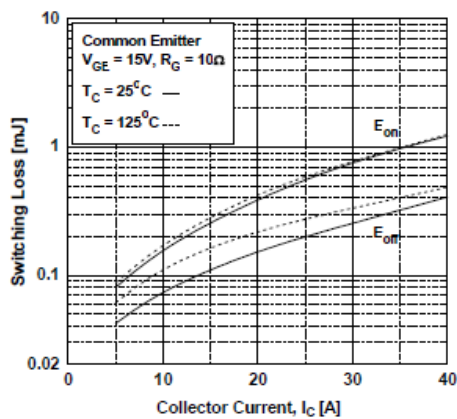
栅电荷特性



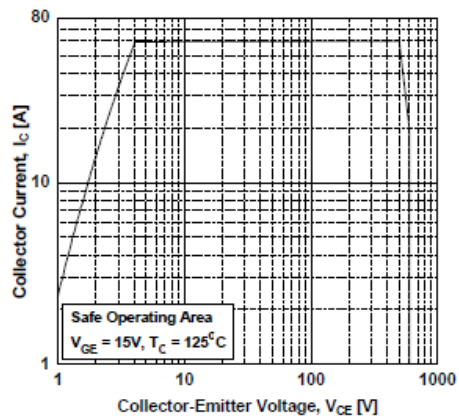
安全工作区



开启特性和栅极电阻关系曲线

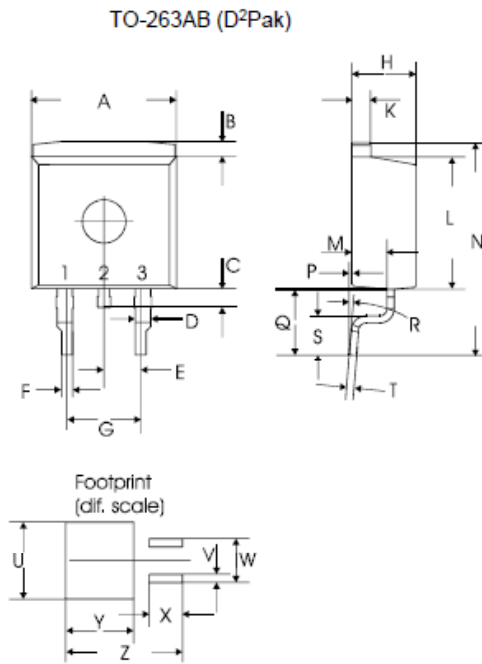


开关损耗和集电极电流关系曲线



关断 SOA 特性曲线

## 附录：封装尺寸



symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.80	10.20	0.3858	0.4016
B	0.70	1.30	0.0276	0.0512
C	1.00	1.60	0.0394	0.0630
D	1.03	1.07	0.0406	0.0421
E	2.54 typ.		0.1 typ.	
F	0.65	0.85	0.0256	0.0335
G	5.08 typ.		0.2 typ.	
H	4.30	4.50	0.1693	0.1772
K	1.17	1.37	0.0461	0.0539
L	9.05	9.45	0.3563	0.3720
M	2.30	2.50	0.0906	0.0984
N	15 typ.		0.5906 typ.	
P	0.00	0.20	0.0000	0.0079
Q	4.20	5.20	0.1654	0.2047
R	8° max		8° max	
S	2.40	3.00	0.0945	0.1181
T	0.40	0.60	0.0157	0.0236
U	10.80		0.4252	
V	1.15		0.0453	
W	6.23		0.2453	
X	4.60		0.1811	
Y	9.40		0.3701	
Z	16.15		0.6358	

 <b>D. G. M. E.</b>	DG10N60	Version No. : V1.0
	IGBT	

## General Description

IGBT has been the major switching device in power electronic applications as it has the merits of both power bipolar and power MOSFET. It has been widely used in high voltage field, which ranges from industrial areas such as inverters, high voltage switch, and motor operation to PDP or home appliance.

## Features

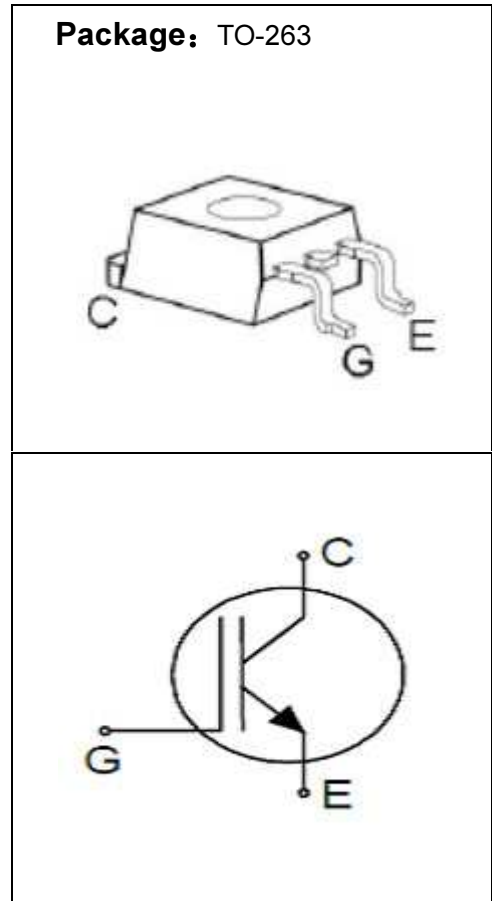
- Employing NPT technology
- High speed switching:  $t_f = 110\text{ns}$
- Low saturation voltage:  $V_{CE(sat)} = 2.15\text{V} @ I_c=10\text{A}$
- High input impedance

## Applications

Welder

## Characteristic parameter

SYMBOL	Value	Unit
$V_{(BR)CES}$	600	V
$I_c$	10	A
$V_{CE(sat)}$	2.15	V



## Maximum Ratings

$T_c=25^\circ\text{C}$ , unless otherwise specified

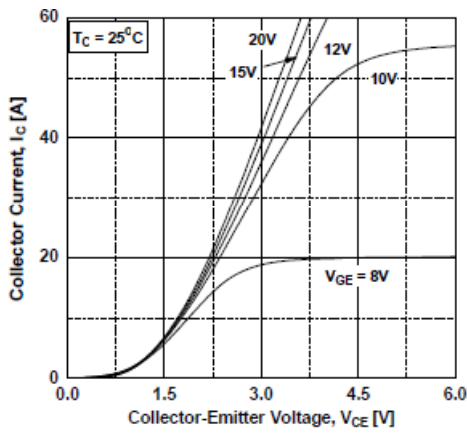
PARAMETER	SYMBOL	Value	Unit
Collector-emitter voltage	$V_{CE}$	600	V
DC collector	$I_c$	10	A
Pulsed collector current	$I_{cpuls}$	60	A
Gate-emitter voltage	$V_{GE}$	$\pm 30$	V
Power dissipation $T_c=25^\circ\text{C}$	$P_D$	280	W
Operating junction temperature	$T_J$	-55 to +150	$^\circ\text{C}$
Storage temperature	$T_{STG}$	-55 to +150	$^\circ\text{C}$

## Electrical Characteristic

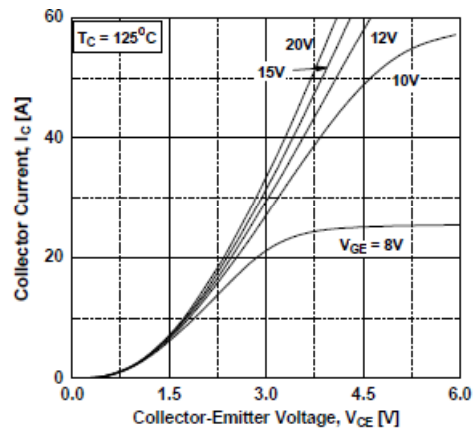
at  $T_c=25^{\circ}\text{C}$ , unless otherwise specified

PARAMETER	SYMBOL	Conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)CES}$	Collector-emitter breakdown voltage	$V_{GE}=0$ $I_C=250\mu\text{A}$	600			V
$I_{CES}$	Zero gate voltage collector current	$V_{GE}=0$ $V_{CE}=600\text{V}$			280	$\mu\text{A}$
$I_{GSS}$	Gate-emitter leakage current	$V_{CE}=0$ $V_{GE}=20\text{V}$			300	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	$V_{GE}=V_{CE}$ , $I_D=250\mu\text{A}$	3.0		6.0	V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$V_{GE}=15\text{V}$ , $I_C=10\text{A}$		2.2	2.5	V
$C_{iss}$	Input capacitance	$V_{CE}=30\text{V}$ , $V_{GE}=0$ , $f=1\text{MHz}$		1500		pF
$C_{oss}$	output capacitance			150		pF
$C_{rss}$	Reverse transfer capacitance			50		pF
$Q_g$	Gate charge	$V_{CC}=400\text{V}$ $I_C=10\text{A}$ $V_{GE}=15\text{V}$		105	145	nC
$t_d(on)$	Turn-on delay time	$V_{CC}=400\text{V}$ , $I_C=10\text{A}$ , $R_G=10\ \Omega$ Inductive load		30		ns
$t_r$	Rise time			40		ns
$t_d(off)$	Turn-off delay time			120		ns
$t_f$	Fall time			100		ns
$E_{on}$	Turn-on energy			0.50		mJ
$E_{off}$	Turn-off energy			1.80		mJ
$t_d(on)$	Turn-on delay time	$V_{CC}=400\text{V}$ , $I_C=10\text{A}$ , $R_G=10\ \Omega$ $T_C=150^{\circ}\text{C}$ Inductive load		31		ns
$t_r$	Rise time			42		ns
$t_d(off)$	Turn-off delay time			130		ns
$t_f$	Fall time			115		ns
$E_{on}$	Turn-on energy			0.66		mJ
$E_{off}$	Turn-off energy			2.0		mJ

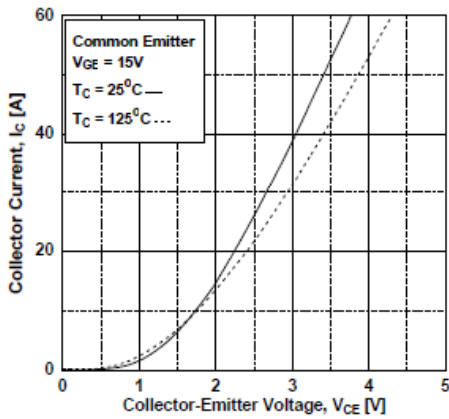
## Characteristic curves



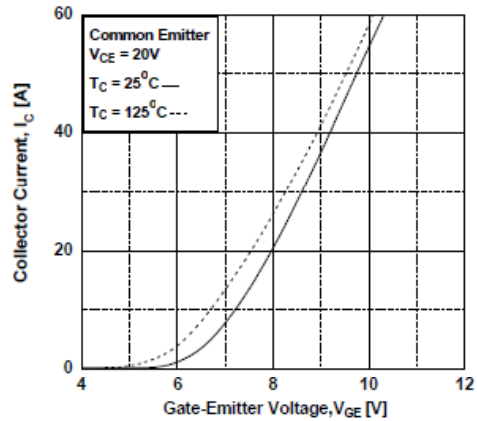
Typical output characteristic  
( $T_C=25^{\circ}\text{C}$ )



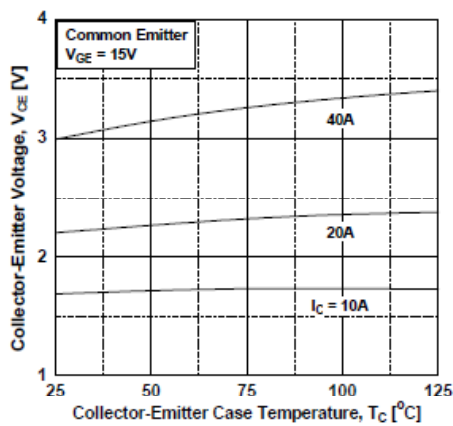
Typical output characteristic  
( $T_C=150^{\circ}\text{C}$ )



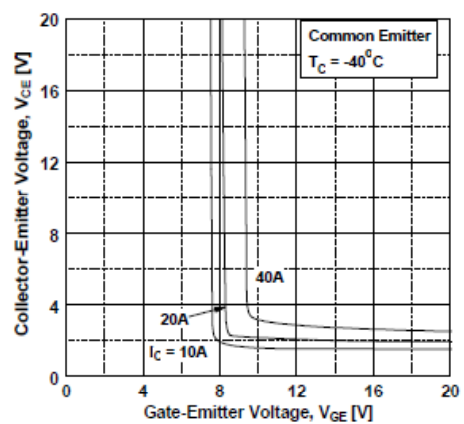
Typical collector-emitter saturation  
voltage characteristic



Typical transfer characteristic

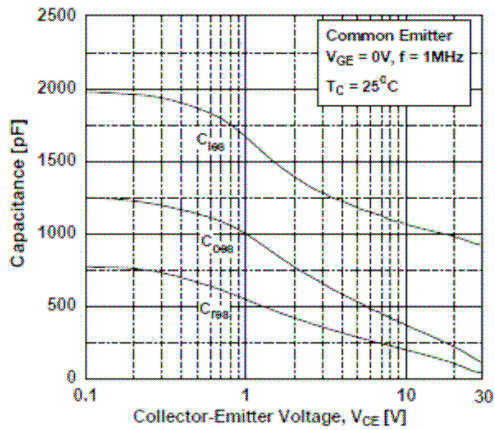


Typical collector-emitter voltage as a  
function of junction temperature

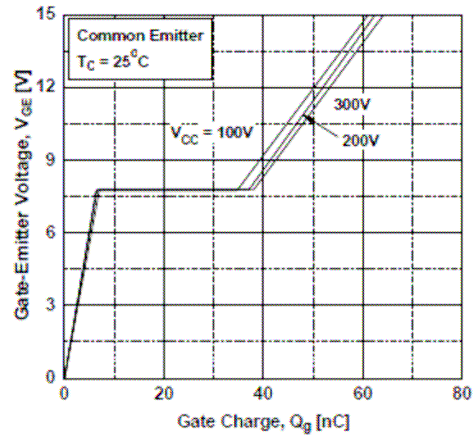


Typical collector-emitter voltage as a  
function of Gate-emitter voltage



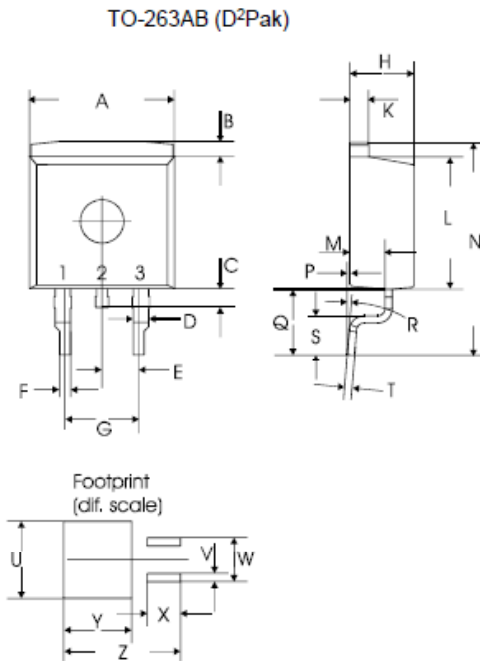


Typical capacitance as a function of collector-emitter voltage  
( $V_{GE}=0V$   $f=1MHz$ )



Typical gate charge

## Package Dimension



symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.80	10.20	0.3858	0.4016
B	0.70	1.30	0.0276	0.0512
C	1.00	1.60	0.0394	0.0630
D	1.03	1.07	0.0406	0.0421
E	2.54 typ.		0.1 typ.	
F	0.65	0.85	0.0256	0.0335
G	5.08 typ.		0.2 typ.	
H	4.30	4.50	0.1693	0.1772
K	1.17	1.37	0.0461	0.0539
L	9.05	9.45	0.3563	0.3720
M	2.30	2.50	0.0906	0.0984
N	15 typ.		0.5906 typ.	
P	0.00	0.20	0.0000	0.0079
Q	4.20	5.20	0.1654	0.2047
R	8° max		8° max	
S	2.40	3.00	0.0945	0.1181
T	0.40	0.60	0.0157	0.0236
U	10.80		0.4252	
V	1.15		0.0453	
W	6.23		0.2453	
X	4.60		0.1811	
Y	9.40		0.3701	
Z	16.15		0.6358	