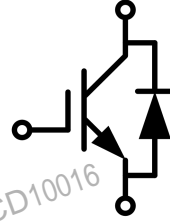


IGBT Discrete with Anti-Parallel Diode

电气特性/ Features and Benefits:

- 1200V 沟槽栅/场终止工艺
1200V trench gate/field termination process
- 低开关损耗
Low switching losses
- Vcesat 正温度系数
Vcesat has a positive temperature coefficient



典型应用/ Applications:

- 变频器
frequency converter
- 伺服电机
Servo motor
- 逆变器
Inverter



$V_{CES} = 1200V$, $I_{C\ nom} = 120A$ / $I_{CRM} = 360A$

关键性能和程序参数 / Key Performance and Package Parameters

Type	V_{CE}	I_C	$V_{CESat}, T_{vj}=25^{\circ}C$	$T_{vj\ max}$	Package
SD120R12I7HB	1200V	120A	1.68V	175°C	TO-247PLUS-3L

双极晶体管/IGBT

最大额定值 / Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
集电极-发射极电压 Collector-Emitter voltage	$T_{vj}=25^{\circ}C$	V_{CES}	1200	V
连续集电极直流电流 Continuous DC collector current	$T_C=100^{\circ}C, T_{vj\ max}=175^{\circ}C$	$I_{C\ nom}$	120	A
集电极重复峰值电流 Repetitive peak collector current	$t_p=1\ ms$	I_{CRM}	360	A
栅极-发射极电压 Gate-emitter voltage		V_{GE}	± 20	V
瞬态栅极-发射极电压 Transient gate-emitter voltage	$t_p \leq 0.5\mu s, D < 0.001$	V_{GE}	± 25	V
短路时间 Short-circuit withstand time	$V_{CC} = 800V, V_{GE} = 15V$, Allowed number of short circuits $< 1000A$, Time between short circuits $\geq 1.0\ s, T_{vj} = 150^{\circ}C$	t_{sc}	8	μs

Changes of this product data sheet are reserved.

Edited by Semi-Future Technologies, Edition 1.4

总功率损耗 Power dissipation	$T_C=25^\circ\text{C}$ $T_C=100^\circ\text{C}$	P_{tot}	1250 625	W
在开关状态下温度 Temperature under switching conditions		$T_{\text{vj op}}$	-40...+175	$^\circ\text{C}$
储存温度 Storage temperature		T_{stg}	-40...+150	$^\circ\text{C}$

热特性 / Thermal Characteristics

Parameter	Conditions	Symbol	Value	Unit
IGBT 热阻, 结-壳 IGBT thermal resistance, junction - case		$R_{\text{th(j-c)}}$	0.12	K/W
二极管热阻, 结-壳 Diode thermal resistance, junction - case		$R_{\text{th(j-c)}}$	0.20	K/W

特征值 / Characteristic Values

Parameter	Conditions	Symbol	Value			Unit	
			Min.	Typ.	Max.		
集电极-发射极饱和电压 Collector-Emitter saturation voltage	$V_{\text{GE}}=15\text{V}, I_{\text{C}}=120\text{A}$ $V_{\text{GE}}=15\text{V}, I_{\text{C}}=120\text{A}$ $V_{\text{GE}}=15\text{V}, I_{\text{C}}=120\text{A}$	$T_{\text{vj}}=25^\circ\text{C}$ $T_{\text{vj}}=150^\circ\text{C}$ $T_{\text{vj}}=175^\circ\text{C}$	V_{CEsat}	1.68 2.21 2.30	2.08	V	
栅极-发射极阈值电压 Gate-Emitter threshold voltage	$I_{\text{C}}=2.34\text{mA}, V_{\text{GE}}=V_{\text{CE}}$	$T_{\text{vj}}=25^\circ\text{C}$	$V_{\text{GE(th)}}$	5.4	6.0	6.6	V
跨导 Transconductance	$V_{\text{CE}}=20\text{V}, I_{\text{C}}=120\text{A}$	$T_{\text{vj}}=25^\circ\text{C}$	G_{fs}	74			S
输入电容 Input capacitance	$f=100\text{kHz}, V_{\text{CE}}=25\text{V}, V_{\text{GE}}=0\text{V}$	$T_{\text{vj}}=25^\circ\text{C}$	C_{ies}	18.1			nF
输出电容 Output capacitance			C_{oes}	0.44			nF
反向传输电容 Reverse transfer capacitance			C_{res}	0.12			nF
门极电荷 Gate charge	$I_{\text{C}}=120\text{A}, V_{\text{GE}}=15\text{V},$ $V_{\text{CE}}=960\text{V}$	$T_{\text{vj}}=25^\circ\text{C}$	Q_{G}	1.08			μC
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{\text{CE}}=1200\text{V}, V_{\text{GE}}=0\text{V}$	$T_{\text{vj}}=25^\circ\text{C}$	I_{CES}		40		μA
栅极-发射极漏电流 Gate-emitter leakage current	$V_{\text{CE}}=0\text{V}, V_{\text{GE}}=20\text{V}$	$T_{\text{vj}}=25^\circ\text{C}$	I_{GES}		100		nA
开通延迟时间 Turn-on delay time	$I_{\text{C}}=120\text{A}, V_{\text{CE}}=600\text{V}$ $V_{\text{GE}}=\pm 15\text{V}, R_{\text{G}}=10\Omega$ (电感负载) / (inductive load)	$T_{\text{vj}}=25^\circ\text{C}$ $T_{\text{vj}}=175^\circ\text{C}$	$t_{\text{d(on)}}$	130 108			ns
上升时间 Rise time	$I_{\text{C}}=120\text{A}, V_{\text{CE}}=600\text{V}$ $V_{\text{GE}}=\pm 15\text{V}, R_{\text{G}}=10\Omega$ (电感负载) / (inductive load)	$T_{\text{vj}}=25^\circ\text{C}$ $T_{\text{vj}}=175^\circ\text{C}$	t_{r}	270 260			ns

关断延迟时间 Turn-off delay time	$I_C=120A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=10\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$	$t_{d(off)}$	254 287		ns
下降时间 Fall time	$I_C=120A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=10\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$	t_f	105 182		ns
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	$I_C=120A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=10\Omega$ $di/dt=370A/\mu s(T_{vj}=175^\circ C)$ (电感负载) / (inductive load)	$T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$	E_{on}	22.40 29.16		mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	$I_C=120A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=10\Omega$ $dv/dt=8000V/\mu s(T_{vj}=175^\circ C)$ (电感负载) / (inductive load)	$T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$	E_{off}	5.88 8.57		mJ

二极管/Diode

最大额定值 / Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj}=25^\circ C$	V_{RRM}	1200	V
连续正向直流电流 Continuous DC forward current	$T_C=100^\circ C, T_{vj\ max}=175^\circ C$	I_F	120	A
正向重复峰值电流 Repetitive peak forward current	$t_p=1ms$	I_{FRM}	360	A

特征值 / Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
正向电压 Forward voltage	$I_F=120A, V_{GE}=0V$ $I_F=120A, V_{GE}=0V$ $I_F=120A, V_{GE}=0V$	$T_{vj}=25^\circ C$ $T_{vj}=150^\circ C$ $T_{vj}=175^\circ C$	V_F	1.77 2.00 1.97	2.30	V
反向恢复峰值电流 Peak reverse recovery current	$I_F=120A,$ $-di_F/dt=300A/\mu s(T_{vj}=175^\circ C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$	I_{RM}	24 42		A
反向恢复电荷 Reverse Recovered charge	$I_F=120A,$ $-di_F/dt=300A/\mu s(T_{vj}=175^\circ C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$	Q_{rr}	6.62 18.00		μC
反向恢复时间 Reverse Recovery Time	$I_F=120A,$ $-di_F/dt=300A/\mu s(T_{vj}=175^\circ C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$	t_{rr}	482 790		ns
反向恢复损耗 (每脉冲) Reverse recovered energy	$I_F=120A,$ $-di_F/dt=300A/\mu s(T_{vj}=175^\circ C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$	E_{rec}	2.04 6.48		mJ

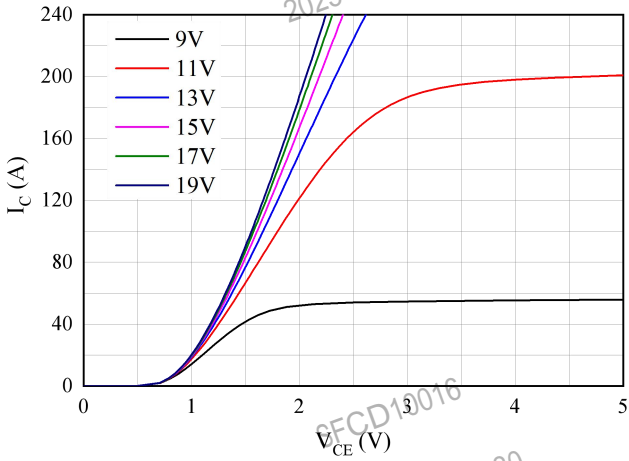


图 1. 典型输出特性 ($T_{vj}=25^{\circ}\text{C}$)

Figure 1. Typical output characteristics ($T_{vj}=25^{\circ}\text{C}$)

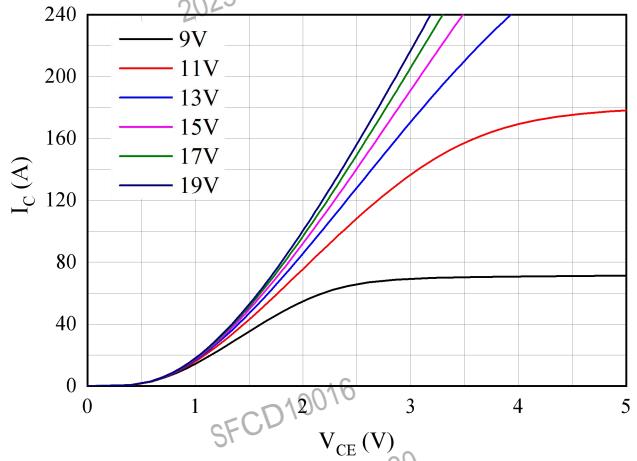


图 2. 典型输出特性 ($T_{vj}=175^{\circ}\text{C}$)

Figure 2. Typical output characteristics ($T_{vj}=175^{\circ}\text{C}$)

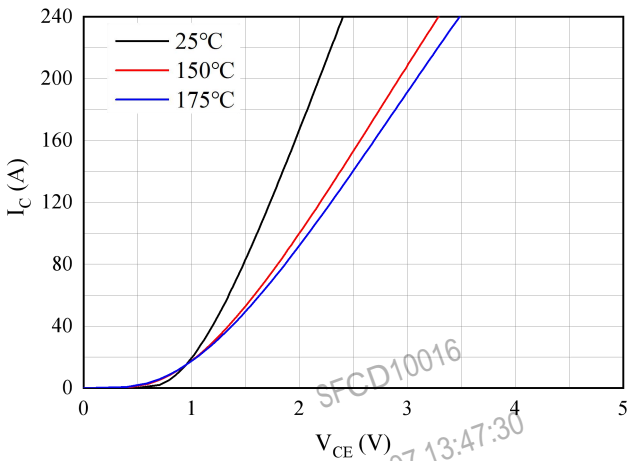


图 3. 典型输出特性 ($V_{GE}=15\text{V}$)

Figure 3. Typical output characteristics ($V_{GE}=15\text{V}$)

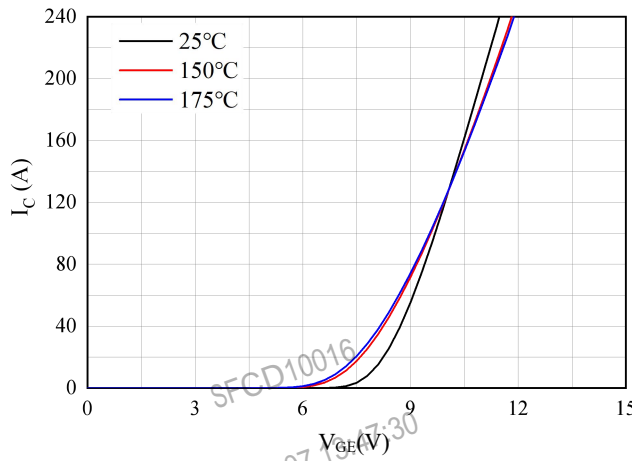


图 4. 典型传输特性 ($V_{CE}=20\text{V}$)

Figure 4. Typical transfer characteristics ($V_{CE}=20\text{V}$)

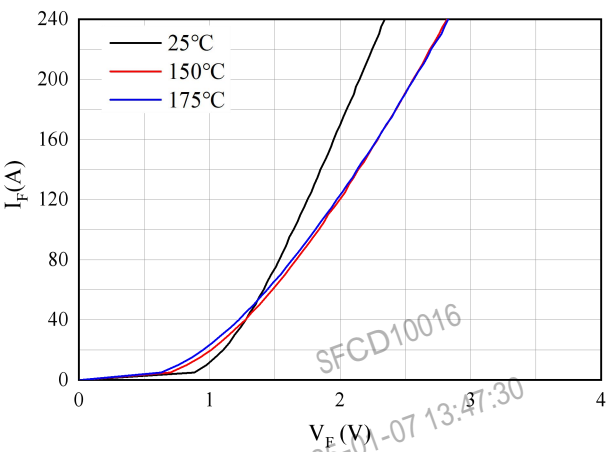


图 5. 正向偏压特性 二极管

Figure 5. Forward characteristic of Diode

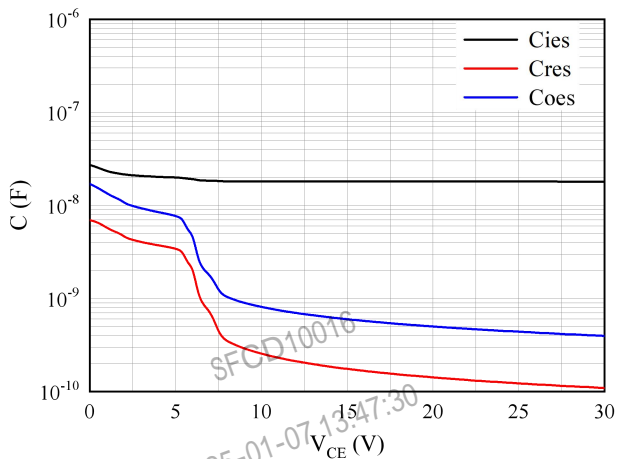


图 6. 电容特性

Figure 6. Capacitance characteristic

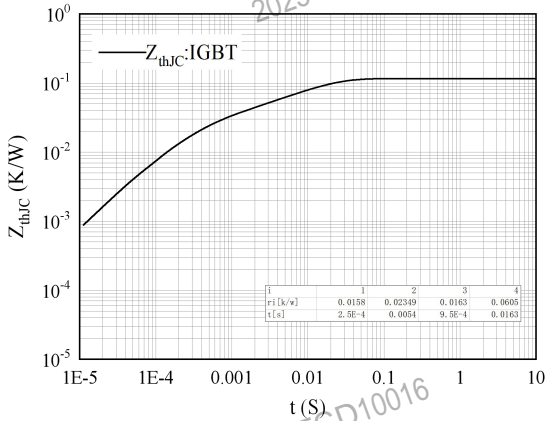


图 7. 瞬态热阻抗 IGBT

Figure 7. Transient thermal impedance IGBT, $Z_{thJC}=f(t)$

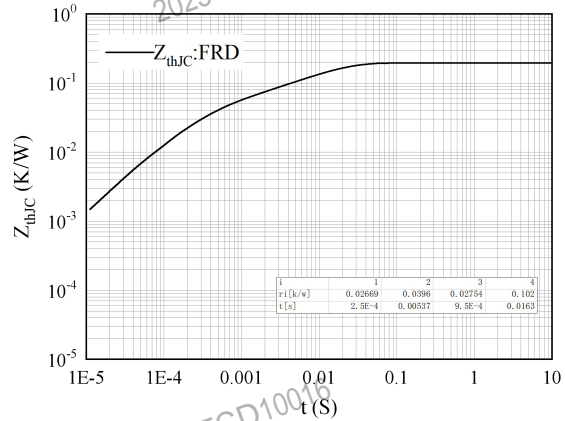


图 8. 瞬态热阻抗 FRD

Figure 8. Transient thermal impedance FRD, $Z_{thJC}=f(t)$

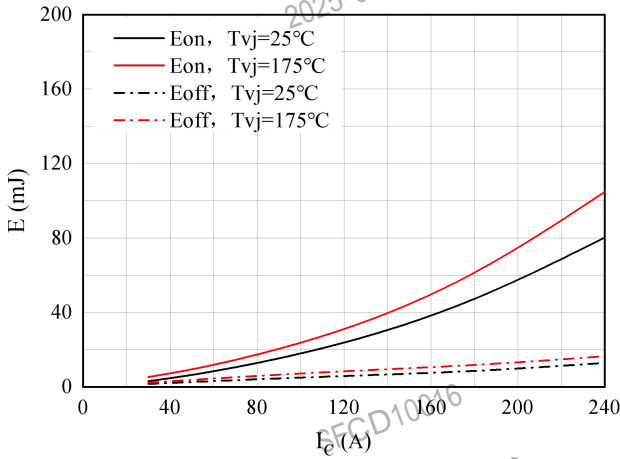


图 9. 开关损耗

Figure 9. Switching losses of IGBT
 $V_{GE}=\pm 15V, R_{gon}=10\Omega, R_{goff}=10\Omega, V_{CE}=600V$

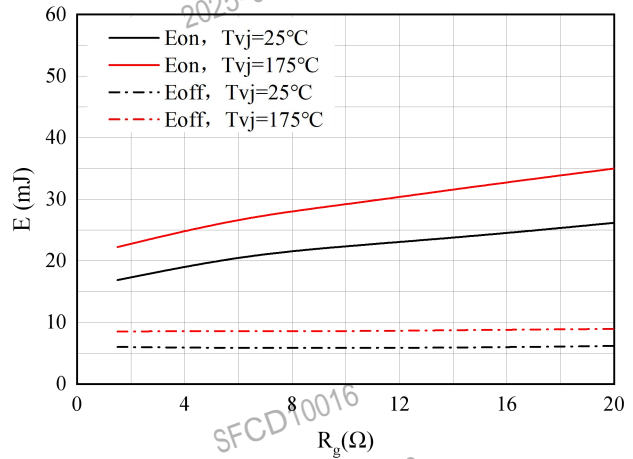


图 10. 开关损耗

Figure 10. Switching losses of IGBT
 $V_{GE}=\pm 15V, I_C=120A, V_{CE}=600V$

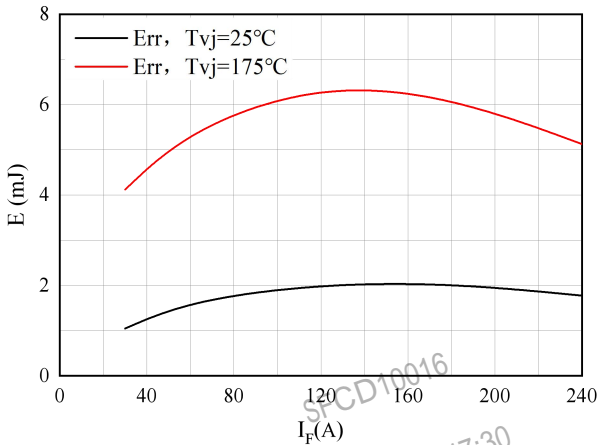


图 11. 开关损耗 二极管

Figure 11. Switching losses of Diode
 $R_{gon}=10\Omega, V_{CE}=600V$

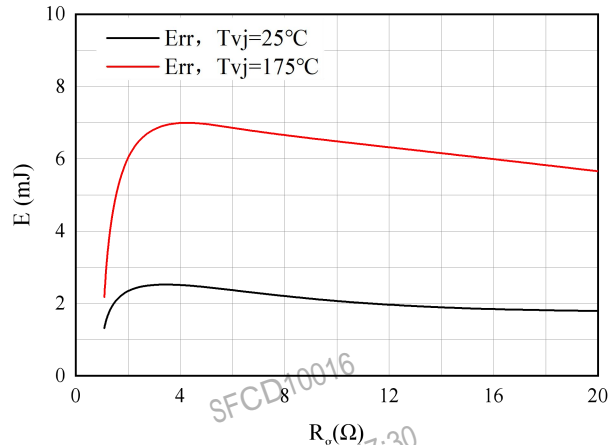
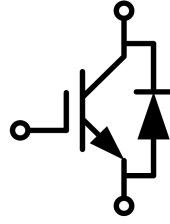


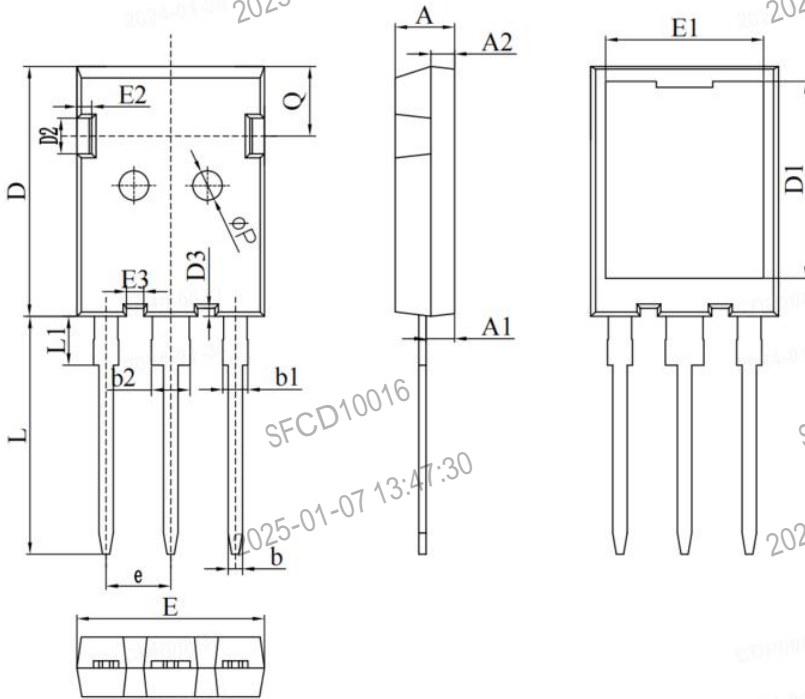
图 12. 开关损耗 二极管

Figure 12. Switching losses of Diode
 $I_F=120A, V_{CE}=600V$

接线图 / Circuit diagram



封装尺寸 / Package outlines



符号	单位: mm		
	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
D	20.9	20.0	21.1
D1	16.25	16.55	16.85
D2	2.90	3.00	3.10
D3	0.58	0.68	0.78
E	15.7	15.8	15.9
E1	13.1	13.3	13.5
E2	1.14	1.24	1.34
E3	1.35	1.45	1.55
e	5.45BSC		
L	19.80	20.00	20.20
L1	3.90	4.10	4.30
Q	5.70	5.85	6.00
b	1.10	1.20	1.30
b1	1.95	2.10	2.25
b2	2.95	3.10	3.25
c	0.50	0.60	0.70