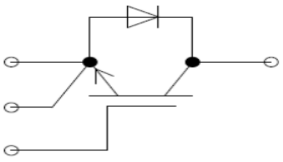
IGBT Module



Equivalent Circuit Schematic

Features

- 1200V 600A, $V_{CE(sat)(typ.)}$ = 3.0 V
- Ultrafast switching speed
- Excellent short circuit ruggednesss
- 62mm Single tube module

Mechanical Data

- **Case:** D2(6 2mm)(plastic package). Lead free; RoHS compliant
- **Molding Compound Flammability Rating:** UL 94 V-0

Benefits

- Inverter for motor drive
- AC and DC servo drive amplifier
- Excellent Current Sharing in Parallel Operation

Applications

CREATEK's IGBTs offer lower losses and higher energy for application such as motor drive ,UPS, inverter and other soft switching applications.

Absolute Maximum Ratings of IGBT

Symbol	Parameter		Value	Units
V_{CES}	Collector to Emitter Voltage		1200	V
V_{GES}	Continuous Gate to Emitter Voltage		±30	V
I_C	Continuous Collector Current	T_C = 25°C	1200	A
		T_C = 100°C	600	
I_{CM}	Pulse Collector Current	T_J = 150°C	1200	A
P_D	Maximum Power Dissipation (IGBT)	T_C = 25°C, T_J = 150°C	2660	W
t_{sc}	Short Circuit Withstand Time		> 10	μs
T_J	Maximum IGBT Junction Temperature		150	°C
T_{JOP}	Maximum Operating Junction Temperature Range		-40 to +150	°C
T_{stg}	Storage Temperature Range		-40 to +125	°C

Absolute Maximum Ratings of Freewheeling Diode

Symbol	Parameter		Value	Units
V_{RRM}	Repetitive Peak Reverse Voltage Preliminary Data		1200	V
I_F	Diode Continuous Forward Current	T_C = 25°C	1200	A
	Diode Continuous Forward Current	T_C = 100°C	600	
I_{FM}	Diode Maximum Forward Current		1200	A

Electrical Characteristics of IGBT(Tj=25℃ unless otherwise noted)

Symbol	Parameter	TestConditions		Min.	Typ.	Max.	Units
BV_{CES}	Collector to Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 1mA		1200			V
I_{CES}	Collector to Emitter Leakage Current	V_{GE} = 0V,V_{CE} = V_{CES}				5	mA
I_{GES}	Gate to Emitter Leakage Current	V_{GE} = ±30V, V_{CE} = 0V				400	nA
$V_{GE(th)}$	Gate Threshold Voltage	I_C = 1mA, V_{CE} = V_{GE}		4.5		5.7	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Module Level)	I_C = 600A, V_{GE} = 15V	T_J = 25°C		3.00	3.20	V
			T_J = 125°C		3.60		

Electrical Characteristics of IGBT(Tj=25℃ unless otherwise noted)

Symbol	Parameter	TestConditions		Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 600V I_C = 600A R_G = 1.1Ω V_{GE} = ±15V Inductive Load	T_J = 25°C		140		ns
			T_J = 125°C		150		
t_r	Turn-on Rise Time		T_J = 25°C		120		ns
			T_J = 125°C		125		
$t_{d(off)}$	Turn-off Delay Time		T_J = 25°C		870		ns
			T_J = 125°C		920		
t_f	Turn-off Fall Time		T_J = 25°C		120		ns
			T_J = 125°C		135		
E_{on}	Turn-on Switching Loss		T_J = 25°C		15.5		mJ
			T_J = 125°C		25.0		
E_{off}	Turn-off Switching Loss		T_J = 25°C		43.0		mJ
			T_J = 125°C		52.5		
Q_g	Total Gate Charge		T_J = 25°C		5000		nC
R_{gint}	Integrated gate resistor	f = 1M; Vpp = 1V	T_J = 25°C		1.3		Ω
C_{ies}	Input Capacitance	V_{CE} = 25V V_{GE} = 0V f = 1MHz	T_J = 25°C		50		nF
C_{oes}	Output Capacitance		T_J = 25°C		7.0		
C_{res}	Reverse Transfer Capacitance		T_J = 25°C		4.0		
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (IGBT)					0.047	°C/W

Electrical and Switching Characteristics of Freewheeling Diode

Symbol	Parameter	TestConditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F = 600A , V_{GE} = 0V	T_J = 25°C		1.90	2.20	V
			T_J = 125°C		1.90		
t_{rr}	Diode Reverse Recovery Time	I_F = 600A, di/dt=6500A/μs, V_{rr} = 600V,	T_J = 25°C		230		ns
			T_J = 125°C		320		
I_{rr}	Diode Peak Reverse Recovery Current		T_J = 25°C		450		A
			T_J = 125°C		590		
Q_{rr}	Diode Reverse Recovery Charge		T_J = 25°C		56.5		nC
			T_J = 125°C		98.0		
E_{rr}	Diode Reverse Recovery Energy		T_J = 25°C		25.0		mJ
			T_J = 125°C		37.5		
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Diode)					0.057	°C/W

Absolute Maximum Ratings of Freewheeling Diode

Symbol	Parameter	Min.	Typ.	Max.	Units
V_{iso}	Isolation Voltage (All Terminals Shorted),f = 50Hz, 1minute	2500			V
$R_{\theta CS}$	Case-To-Sink(Conductive Grease Applied)		0.1		°C/W
M	Power Terminals Screw: M4	1.0		2.0	N·m
	Power Terminals Screw: M6	3.0		5.0	N·m
M	Mounting Screw: M6	4.0		6.0	N·m
G	Weight		320		g

Typical Characteristics (T_{amb} = 25 °C unless otherwise specified)

Fig 1. output characteristic IGBT,
$I_C=f(V_{CE})$,VGE=15V

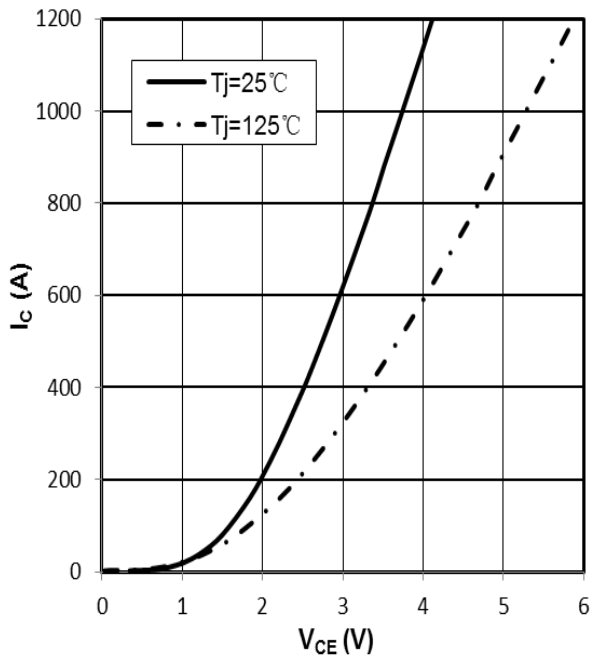


Fig 2. output characteristic IGBT,
$I_C=f(V_{CE})$,T_j=125℃

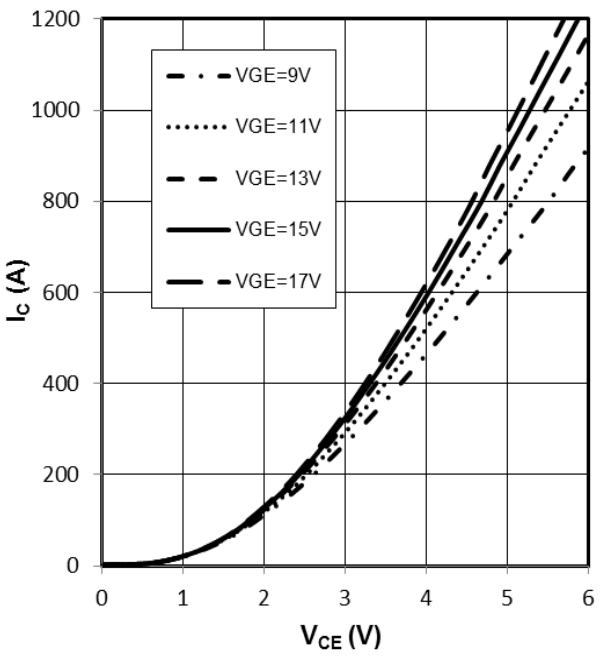


Fig 3. transfer characteristic IGBT,
$I_C=f(V_{GE})$,V_{CE}=20V

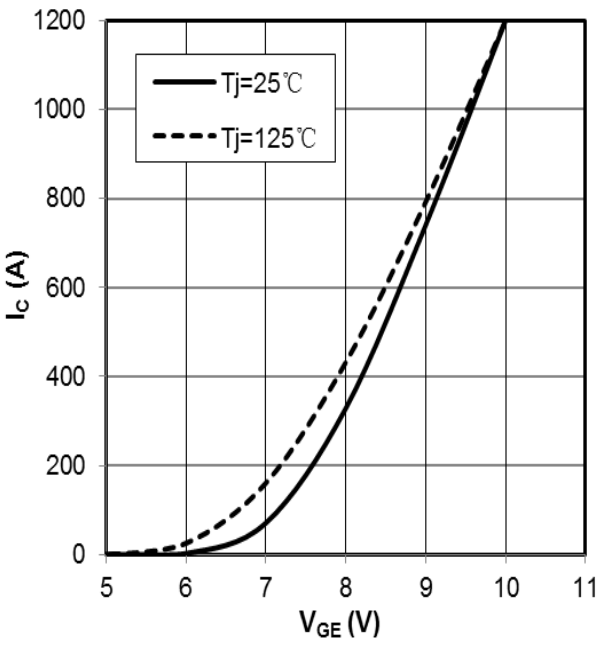


Fig 4. switching losses IGBT, $E_{on}=f(Ic)$,$E_{off}=f(I_C)$,
V_{GE}=±15V,R_{Gon}=1.1Ω,R_{Goff}=1.1Ω,V_{CE}=600V

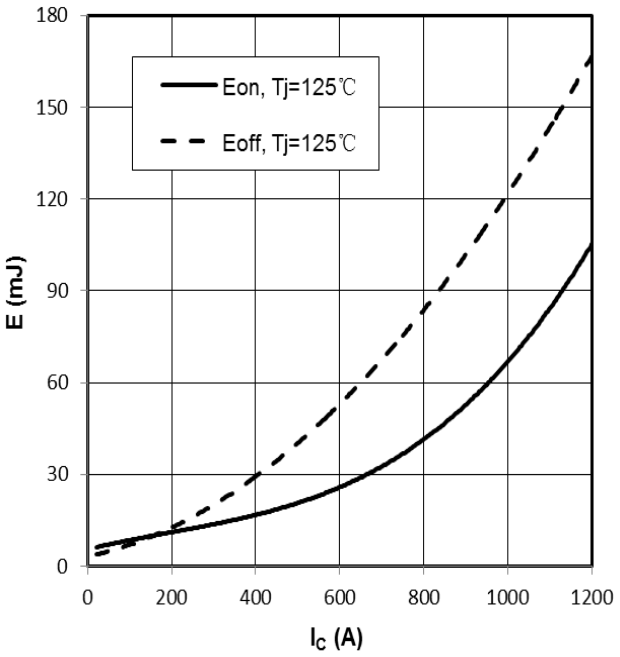


Fig 5. switching losses IGBT,

$E_{on}=f(R_G),E_{off}=f(R_G)$, $V_{GE}=\pm15V,I_C=600A,V_{CE}=600V$

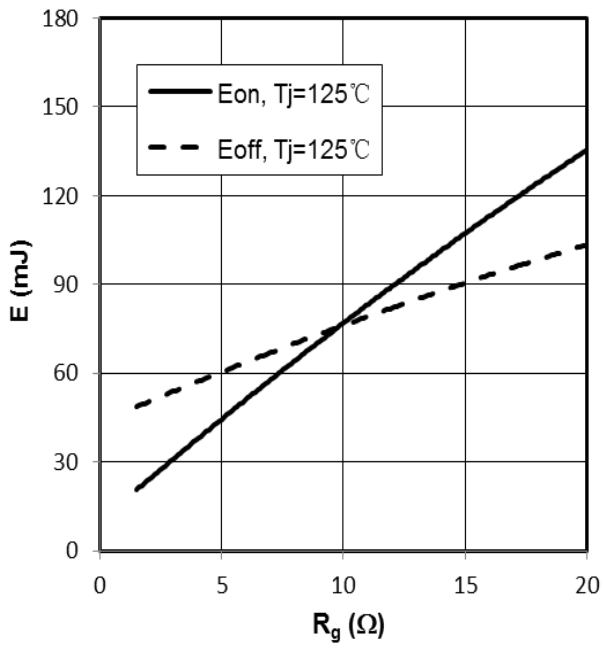


Fig 6. transient thermal impedance IGBT , Zthjc=f(t)

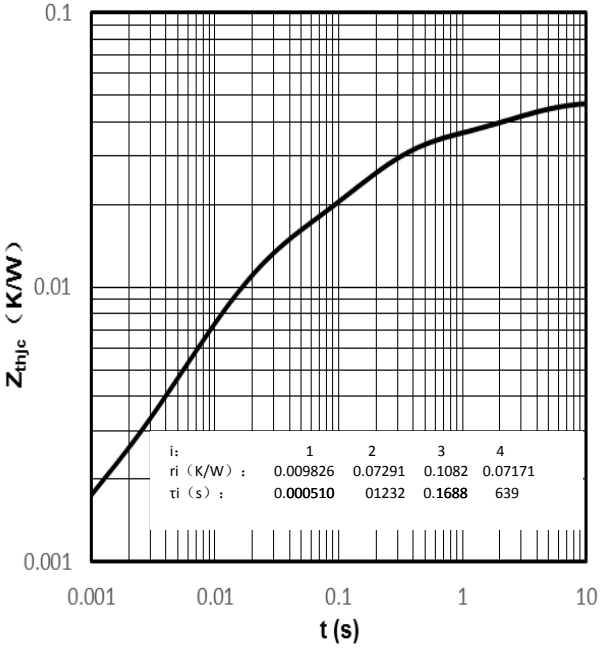


Fig 7. reverse bias safe operating area IGBT,

$I_C=f(V_{CE}),V_{GE}=\pm15V,R_{Goff}=1.1\Omega$，Tvj=125℃

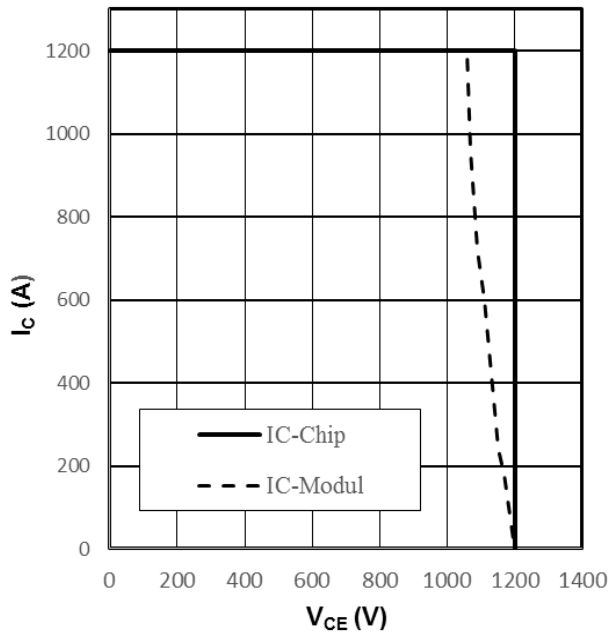


Fig 8. forward characteristic of Diode， $I_F=f(V_F)$

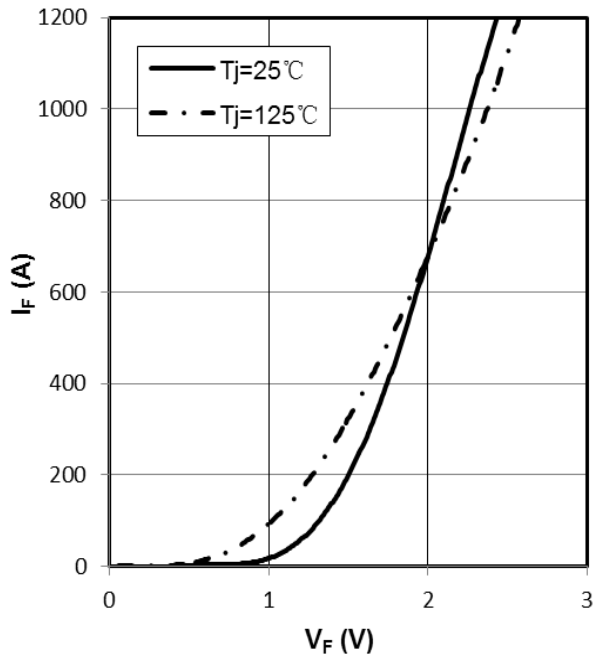


Fig 9. switching losses Diode,
$E_{rr}=f(I_F),R_{Gon}=1.1\ \Omega,V_{CE}=600V$

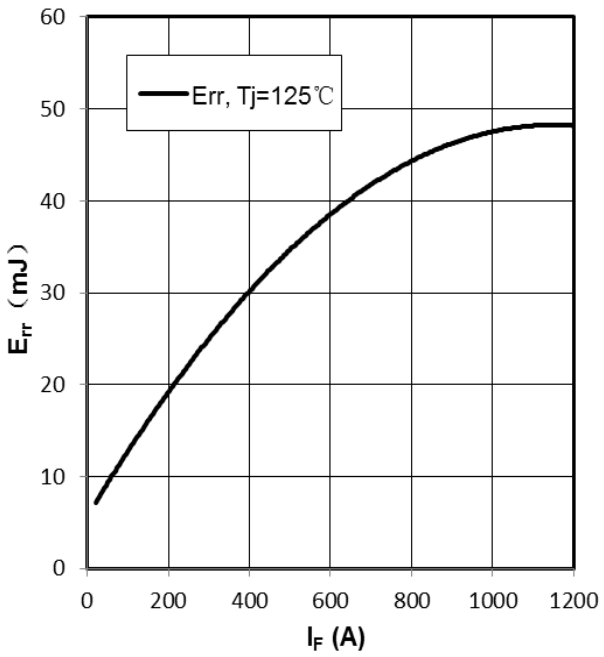
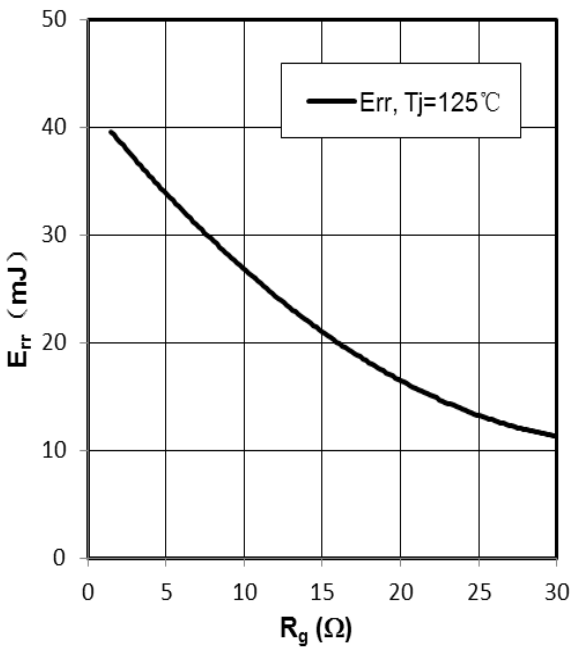
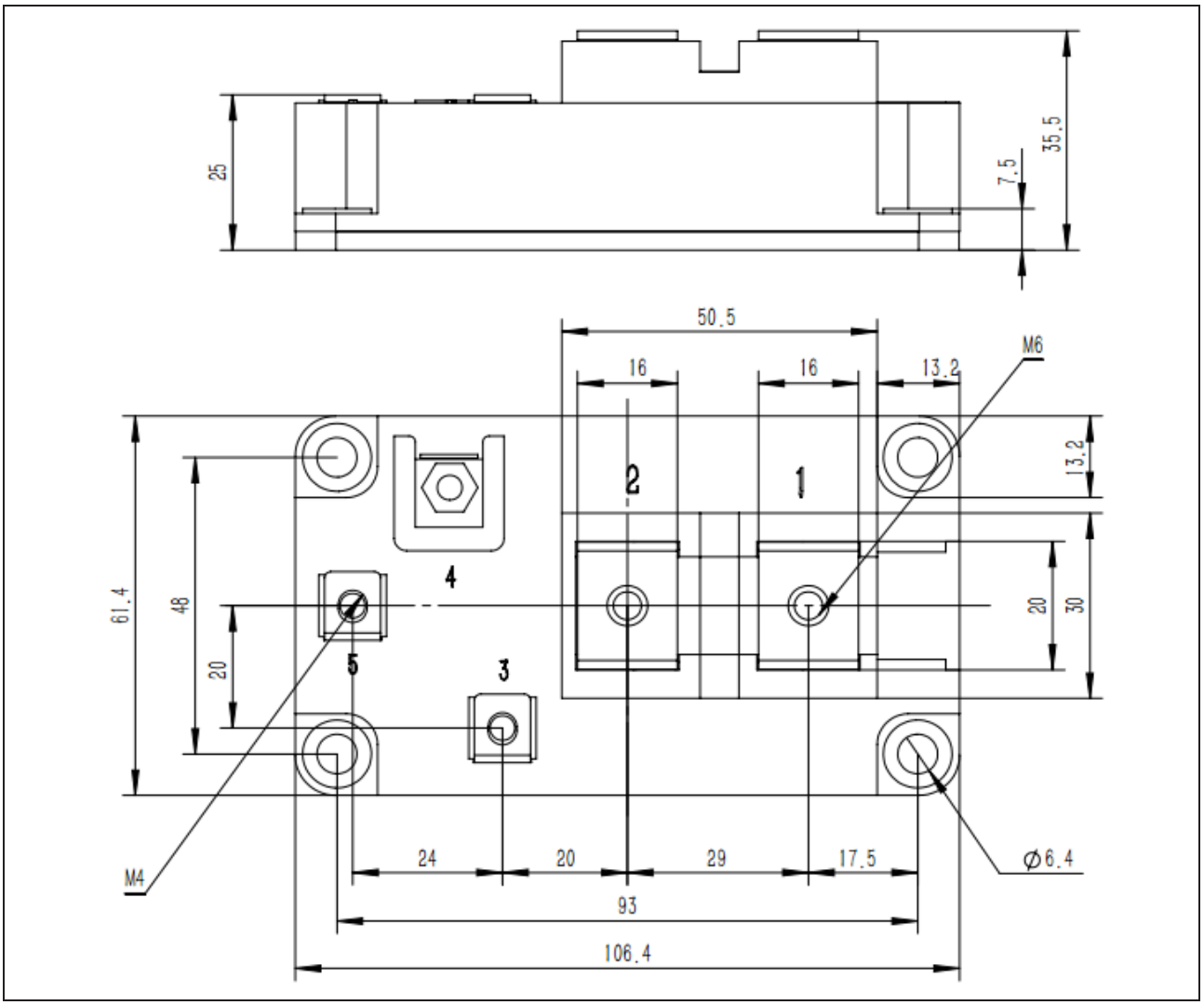


Fig 10. switching losses Diode,
$E_{rr}=f(R_G),I_F=400A,V_{CE}=600V$



Package Dimensions(mm)



Ordering information

Order code	Package	Packaging option	Base quantity	Packaging specification
GPU600SG120D2	D2(62mm)	BOX	10pcs /BOX	

Revision history

Date	Revision	Changes
23-May-2016	1.0	Initial release
30-July-2018	2.0	Update

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