

ROOF MOUNT & FASTENER	
ROOF MOUNT:	
MAKE	SOLAR ROOF HOOK
MODEL	L-FOOT
MATERIAL	ALUMINUM
FASTENER	
MAKE	SOLAR ROOF HOOK
MODEL	QUICKBOLT
MATERIAL	304 SS
SIZE	5/16-18 X 7"
GENERAL	
WEIGHT	1 LBS
FASTENERS PER MOUNT	1
MAX. PULL-OUT FORCE	960 LBS. / MOUNT
SAFETY FACTOR	2.0
DESIGN PULL-OUT FORCE	480 LBS. / MOUNT

ARRAY SUMMARY	
# MODULES	22
MOD. ATT. MID	36
MOD. ATT. END	12
ROOF MOUNTS	34
RAIL LENGTH	167 FT.
ARRAY AREA	403 sqft.
ARRAY WEIGHT	1140 LBS.
AZIMUTH @ SN	168°
TILT ANGLE	41°

PV MODULES	
MAKE	HANWHA Q-CELL
MODEL	Q PEAK DUO-G5 315
WIDTH	39 in.
LENGTH	66 in.
THICKNESS	1.3 in.
WEIGHT	40 LBS.

MOUNTING RAILS	
MAKE	UNIRAC
MODEL	SM STANDARD
MATERIAL	ALUMINUM
WEIGHT	1.25 LBS. / FT.
SPACING	34 in.


ROOF SUMMARY	
STRUCTURE:	
TYPE	TRUSSES
MATERIAL	SOUTHERN PINE #2
SIZE	2" X 4"
SPACING	24" o.c.
EFF. SPAN	12'-3"
PITCH	10 / 12
DENSITY	30 LBS./cu.ft.
DECKING:	
TYPE	OSB
MATERIAL	WOOD COMPOSITE
THICKNESS	7/16"
WEIGHT	1.6 LBS./sqft.
ROOFING:	
TYPE	ARCH SHINGLE
MATERIAL	ASPHALT
WEIGHT	2.3 LBS./sqft.

ROOF LOADING	
DEAD LOAD:	
ROOFING	3.9 LBS./sqft.
PV ARRAY	2.8 LBS./sqft.
TOTAL	6.7 LBS./sqft.
WIND LOAD:	
UPLIFT ZONE 1	-24.6 LBS./sqft.
UPLIFT ZONE 2	-29.0 LBS./sqft.
UPLIFT ZONE 3	-29.0 LBS./sqft.
DOWNWARD	23.0 LBS./sqft.
FASTENER LOAD:	
UPLIFT ZONE 1	-362 LBS.
UPLIFT ZONE 2	-284 LBS.
UPLIFT ZONE 3	-142 LBS.
DOWNWARD	343 LBS.

ROOF ZONES:	
ALL ZONES	MAX. OVERHANG = 16"
ZONE 1	MAX. FASTENER SPAN ZONE 1 = 72"
ZONE 2	MAX. FASTENER SPAN ZONE 2 = 48"
ZONE 3	MAX. FASTENER SPAN ZONE 3 = 24"

**STATEMENT OF STRUCTURAL COMPLIANCE**


THE EXISTING ROOF STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE ADDITIONAL LOADS OF THE PURPOSED PV SYSTEM. IN ADDITION, THE RACKING AND FASTENING SYSTEM SHALL BE CAPABLE OF SECURING THE SYSTEM TO THE STRUCTURE UNDER DESIGN CONDITIONS WHEN INSTALLED PROPERLY AND IN ACCORDANCE WITH THE RACKING AND FASTENING ARRANGEMENT DETAILED WITHIN THESE DRAWINGS.

SIGNED: 

NAME: ANDREW W. KING, PE

TITLE: PROFESSIONAL ENGINEER

ENGINEER:




**MODEL ENERGY**  
 300 FAYETTEVILLE ST.  
 #1430  
 RALEIGH, NC 27602  
 919-274-9905  
 MODELENERGY.COM  
 P.1194

JOB TITLE:

**NEW SOLAR PV SYSTEM**  
 6.93 KW DC INPUT  
 7.6 KW AC EXPORT

**RYAN LEBLANC**  
 36 MEADOW VIEW CT  
 FUQUAY VARINA, NC 27526

CLIENT:



ISSUED FOR: CONSTRUCTION DATE: 01/23/19

SITE & STRUCTURAL INFORMATION

**PV2.1**

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PV MODULES	
MAKE	HANWHA Q-CELL
MODEL	Q PEAK DUO-G5 315
TECHNOLOGY	MONO-CRYST
NOM. POWER (P <sub>nom</sub> )	315 WATTS
NOM. VOLT. (V <sub>MP</sub> )	32.98 VOLTS
O.C. VOLT. (V <sub>oc</sub> )	39.87 VOLTS
MAX. SYS. VOLT.	1000 V (UL)
TEMP. COEF. (V <sub>tc</sub> )	-0.28 %/°C
NOM. CURR. (I <sub>MP</sub> )	9.55 AMPS
S.C. CURR. (I <sub>sc</sub> )	10.04 AMPS
MAX. SERIES FUSE	20 AMPS

MODULE OPTIMIZER	
MAKE	SOLAREEDGE
MODEL	P320
DC INPUT	
NOM. POWER	320 WATTS
VOLT. RANGE	8-48
MAX. CURR.	11.0 AMPS
DC OUTPUT	
NOM. POWER	320 WATTS
MAX. VOLT.	60 VOLTS
MAX. CURR.	15 AMPS
MIN. STRING	8 OPTIMIZERS
MAX. STRING	25 OPTIMIZERS
MAX. POWER	5700 WATTS

JUNCTION BOX	
MAKE	SOLADECK
MODEL	0783-3R
PRO. RATING	NEMA 3R
VOLT. RATING	600 VOLTS
AMP RATING	120 AMPS
UL LISTING	UL 50

CONDUCTOR SCHEDULE													
TAG	CURRENT CARRYING CONDUCTORS				GROUNDING CONDUCTORS				CONDUIT/RACEWAY				NOTES
	QTY	SIZE	MATERIAL	INSULATION	QTY	SIZE	MATERIAL	INSULATION	QTY	SIZE	MATERIAL	LOCATION	
C1	4	10 AWG	COPPER	PV WIRE	1	6 AWG	COPPER	BARE	-	-	-	FREE AIR	1
C2	4	10 AWG	COPPER	THWN-2	1	10 AWG	COPPER	THWN-2	1	1/2"	EMT	EXTERIOR	2,4
C3	3	8 AWG	COPPER	THWN	1	10 AWG	COPPER	THWN	1	3/4"	EMT	EXTERIOR	2,4
XC	-	-	-	-	-	-	-	-	-	-	-	-	3

**NOTES:**

1. MANUFACTURER PROVIDED, UL LISTED WIRING HARNESS FOR USE ON EXPOSED ROOFS
2. CONDUIT SIZE SHOWN IS CODE MINIMUM. LARGER SIZES ARE ALLOWED.
3. EXISTING CONDUCTORS, FIELD VERIFY
4. EQUIPMENT TERMINAL RATING SHALL BE A MINIMUM OF 75°C AT BOTH END OF CONDUCTOR

DC/AC INVERTER	
MAKE	SOLAREEDGE
MODEL	SE7600H-US
TECHNOLOGY	TRANSFORMER-LESS
DC INPUT	
MAX. POWER	11800 WATTS
VOLT. RANGE	380-480 VOLTS
NOM. VOLT.	380 VOLTS
MAX. CURRENT	20 AMPS
AC OUTPUT	
NOM. POWER	7600 WATTS
NOM. VOLT.	240 VOLTS
MAX. POWER	7600 WATTS
MAX. CURR.	32 AMPS
GFP (Y/N)	YES
GFCI (Y/N)	YES
AFCI (Y/N)	YES
DC DISC. (Y/N)	YES
RAPID SHUTDOWN	YES
FUSE RATING	15 AMPS
PROTECT. RATING	NEMA 3R

AC DISCONNECT	
MAKE	GENERIC
MODEL	N/A
ENCL. RATING	NEMA 3R
VOLT. RATING	240 VOLTS
AMP RATING	60 AMPS
UL LIST. (Y/N)	YES
FUSED (Y/N)	NO
FUSE RATING	N/A

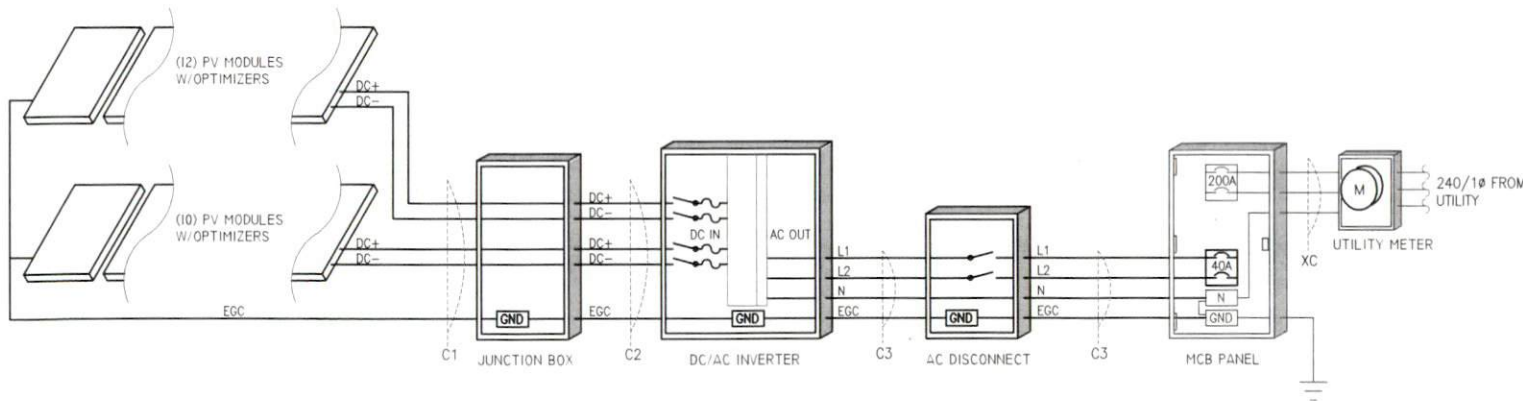
**NOTES:**

- LOAD-BREAK RATED
- VISIBLE OPEN
- LOCKABLE IN OPEN POSITION
- INSTALL ADJACENT TO METER
- DISCONNECT TO BE READILY ACCESSIBLE TO UTILITY COMPANY PERSONNEL AT ALL TIMES

MCB PANEL/SERVICE DISCONNECT (EXISTING)	
MAKE	EATON
MODEL	MBE4040B200BTS
ENCL. RATING	NEMA 3R
VOLT. RATING	600 VOLTS
BUS RATING	200 AMPS
UL LIST. (Y/N)	YES
MAIN BREAKER (Y/N)	YES
BREAKER RATING	200 AMPS

**NOTES:**

- BACK-FEED SOLAR OUTPUT VIA 40A BREAKER AT THE OPPOSITE END OF THE BUS BAR FROM MAIN BREAKER



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ELECTRICAL INFORMATION

PV3.1

PV Labeling minimums for 2017 NEC

1. 690.13(B) - 03-210 -PV system A/C disconnect - on discos and breakers  
A/C output (240V)  
A/C current (continuous output current from inverter nameplate)
2. 690.13(B) - 05-215 -Line and Load - on D/C disconnect (not A/C!!!)
3. 690.31(G)(3) - 02-314 -PV powersource stickers - conduit, Jboxes
4. 690.51 - Modules
5. 690.52 - A/C Modules
6. 690.53 - 05-208 -D/C power source -on inverter  
Max Voltage (600V)  
Max output of optimizer (15A per string)(Maximum and Rated are the same)
7. 690.55(C)(3) - 02-316 - Rapid Shutdown switch - on D/C disconnect switch
8. 690.56(C)(1)(a) - 05-111 - Rapid Shutdown for array and conductors - <3' from  
A/C disco
9. 705.12(B)(2)(3)(b) - 03-344 - Do not relocate - on BFB
10. 705.12 - 05-211 - Dual Power - on Panel with BFB or taps



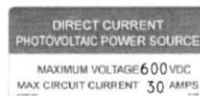
4" x 2"



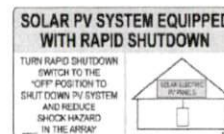
4" X 2"



5 3/4" X 1 1/8"



4" X 2"



6" X 3 1/2"



5 1/4" X 2"



2' X 1"



4" X 2"

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EQUIPMENT LABELS

PV4.1





## Single Phase Inverters

for North America

SE3000H-US / SE3800H-US / SE5000H-US /  
SE6000H-US / SE7600H-US / SE10000H-US

INVERTERS



### Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- High reliability without any electrolytic capacitors
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)





# Single Phase Inverters for North America

SE3000H-US / SE3800H-US / SE5000H-US /  
SE6000H-US / SE7600H-US / SE10000H-US

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	
<b>OUTPUT</b>							
Rated AC Power Output	3000	3800	5000	6000	7600	10000	VA
Max. AC Power Output	3000	3800	5000	6000	7600	10000	VA
AC Output Voltage Min.-Nom.-	✓	✓	✓	✓	✓	✓	Vac
Max. (211 - 240 - 264)							
AC Frequency (Nominal)	59.3 - 60 - 60.5 <sup>(1)</sup>						Hz
Maximum Continuous Output	12.5	16	21	25	32	42	A
Current@240V							
GFDI Threshold	1						A
Utility Monitoring, Islanding							
Protection, Country Configurable	Yes						
Thresholds							
<b>INPUT</b>							
Maximum DC Power	4650	5900	7750	9300	11800	15500	W
Transformer-less, Ungrounded	Yes						
Maximum Input Voltage	480						Vdc
Nominal DC Input Voltage	380						Vdc
Maximum Input Current@240V	8.5	10.5	13.5	16.5	20	27	Adc
Max. Input Short Circuit Current	45						Adc
Reverse-Polarity Protection	Yes						
Ground-Fault Isolation Detection	600k $\Omega$ Sensitivity						
Maximum Inverter Efficiency	99					99.2	%
CEC Weighted Efficiency	99						%
Nighttime Power Consumption	< 2.5						W
<b>ADDITIONAL FEATURES</b>							
Supported Communication	RS485, Ethernet, ZigBee (optional), Cellular (optional)						
Interfaces							
Revenue Grade Data, ANSI C12.20	Optional <sup>(2)</sup>						
Rapid Shutdown - NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect						
<b>STANDARD COMPLIANCE</b>							
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07						
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (H)						
Emissions	FCC Part 15 Class B						
<b>INSTALLATION SPECIFICATIONS</b>							
AC Output Conduit Size / AWG	3/4" minimum / 20-4 AWG						
Range							
DC Input Conduit Size / # of Strings / AWG Range	3/4" minimum / 1-2 strings / 14-6 AWG					3/4" minimum / 1-3 strings / 14-6 AWG	
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174					21.3 x 14.6 x 7.3 / 540 x 370 x 185	in / mm
Weight with Safety Switch	22 / 10	25.1 / 11.4		26.2 / 11.9		38.8 / 17.6	lb / kg
Noise	< 25				< 50		dBA
Cooling	Natural Convection				Natural convection		
Operating Temperature Range	-13 to +140 / -25 to +60 <sup>(3)</sup> (-40 F / -40 C option) <sup>(4)</sup>						F / C
Protection Rating	NEMA 3R (Inverter with Safety Switch)						

<sup>(1)</sup> For other regional settings please contact SolarEdge support

<sup>(2)</sup> Revenue grade inverter P/N: SExxxxH-US000NNC2

<sup>(3)</sup> For power de-rating information refer to: <https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf>

<sup>(4)</sup> -40 version P/N: SExxxxH-US000NNU4





powered by  
**Q.ANTUM DUO**

# Q.PEAK DUO BLK-G5 305-320

## Q.ANTUM SOLAR MODULE

The new Q.PEAK DUO BLK-G5 solar module from Q CELLS impresses with its outstanding visual appearance and particularly high performance on a small surface thanks to the innovative Q.ANTUM DUO Technology. Q.ANTUM's world-record-holding cell concept has now been combined with state-of-the-art circuitry half cells and a six-busbar design, thus achieving outstanding performance under real conditions — both with low-intensity solar radiation as well as on hot, clear summer days.



**Q.ANTUM TECHNOLOGY: LOW LEVELISED COST OF ELECTRICITY**  
Higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 19.3%.



**INNOVATIVE ALL-WEATHER TECHNOLOGY**  
Optimal yields, whatever the weather with excellent low-light and temperature behaviour.



**ENDURING HIGH PERFORMANCE**  
Long-term yield security with Anti LID Technology, Anti PID Technology<sup>1</sup>, Hot-Spot Protect and Traceable Quality Tra.Q™.



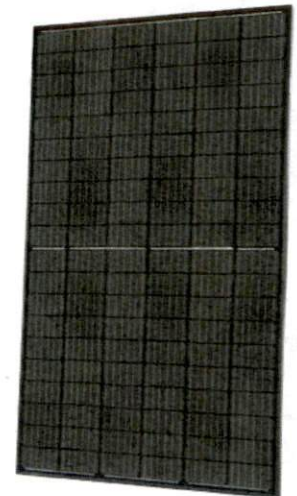
**EXTREME WEATHER RATING**  
High-tech aluminium alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).



**A RELIABLE INVESTMENT**  
Inclusive 12-year product warranty and 25-year linear performance warranty<sup>2</sup>.



**STATE OF THE ART MODULE TECHNOLOGY**  
Q.ANTUM DUO combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology.



www.VDEInfo.com  
ID: 40032587

### THE IDEAL SOLUTION FOR:



Rooftop arrays on residential buildings

Engineered in **Germany**

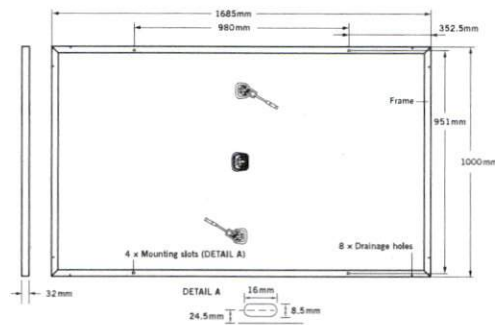
# Q CELLS

<sup>1</sup> APT test conditions according to IEC/TS 62804-1:2015, method B (-1500V, 168 h)

<sup>2</sup> See data sheet on rear for further information.

## MECHANICAL SPECIFICATION

Format	1685 mm × 1000 mm × 32 mm (including frame)
Weight	18.7 kg
Front Cover	3.2 mm thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodised aluminium
Cell	6 × 20 monocrystalline Q.ANTUM solar half cells
Junction box	70-85 mm × 50-70 mm × 13-21 mm Protection class IP67, with bypass diodes
Cable	4 mm <sup>2</sup> Solar cable; (+) 1100 mm, (-) 1100 mm
Connector	Multi-Contact MC4, IP65 and IP68



## ELECTRICAL CHARACTERISTICS

POWER CLASS		305	310	315	320	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC <sup>1</sup> (POWER TOLERANCE +5 W / -0 W)						
Minimum	Power at MPP <sup>2</sup>	$P_{MPP}$ [W]	305	310	315	320
	Short Circuit Current*	$I_{SC}$ [A]	9.78	9.83	9.89	9.94
	Open Circuit Voltage*	$V_{OC}$ [V]	39.75	40.02	40.29	40.56
	Current at MPP*	$I_{MPP}$ [A]	9.31	9.36	9.41	9.47
	Voltage at MPP*	$V_{MPP}$ [V]	32.78	33.12	33.46	33.80
	Efficiency <sup>2</sup>	$\eta$ [%]	≥ 18.1	≥ 18.4	≥ 18.7	≥ 19.0
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NOC <sup>3</sup>						
Minimum	Power at MPP <sup>2</sup>	$P_{MPP}$ [W]	226.0	229.7	233.5	237.2
	Short Circuit Current*	$I_{SC}$ [A]	7.88	7.93	7.97	8.02
	Open Circuit Voltage*	$V_{OC}$ [V]	37.18	37.43	37.69	37.94
	Current at MPP*	$I_{MPP}$ [A]	7.32	7.36	7.41	7.45
	Voltage at MPP*	$V_{MPP}$ [V]	30.88	31.20	31.52	31.84

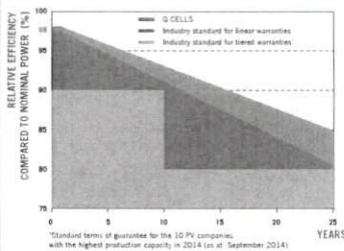
<sup>1</sup>1000 W/m<sup>2</sup>, 25 °C, spectrum AM 1.5 G

<sup>2</sup>Measurement tolerances STC ± 3%; NOC ± 5%

<sup>3</sup>800 W/m<sup>2</sup>, NOCT, spectrum AM 1.5 G

\* typical values, actual values may differ

### Q CELLS PERFORMANCE WARRANTY

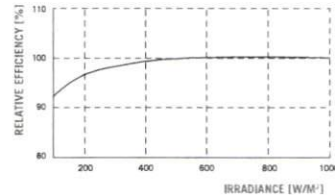


At least 98% of nominal power during first year. Thereafter max. 0.54% degradation per year. At least 93.1% of nominal power up to 10 years. At least 85% of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

\*Standard terms of guarantee for the 10 PV companies with the highest production capacity in 2014 (as of September 2014)

### PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m<sup>2</sup>).

### TEMPERATURE COEFFICIENTS

Temperature Coefficient of $I_{SC}$	$\alpha$ [%/K]	+0.04	Temperature Coefficient of $V_{OC}$	$\beta$ [%/K]	-0.28
Temperature Coefficient of $P_{MPP}$	$\gamma$ [%/K]	-0.37	Normal Operating Cell Temperature	NOCT [°C]	45

### PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage	$V_{SYS}$ [V]	1000	Safety Class	II
Maximum Reverse Current	$I_R$ [A]	20	Fire Rating	C
Push/Pull Load (Test-load in accordance with IEC 61215)	[Pa]	5400/4000	Permitted Module Temperature On Continuous Duty	-40 °C up to +85 °C

### QUALIFICATIONS AND CERTIFICATES

VDE Quality Tested, IEC 61215 (Ed. 2); IEC 61730 (Ed. 1), Application class A  
This data sheet complies with DIN EN 50380.



### PARTNER

**NOTE:** Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS GmbH

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Engineered in Germany

**Q CELLS**