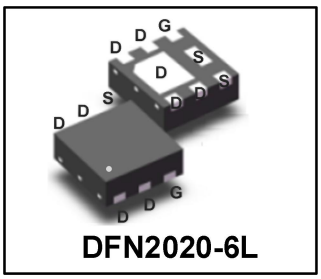
30V N-Channel Enhancement Mode Power MOSFET

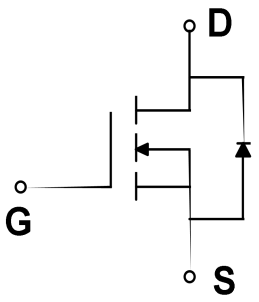
Description

EMR14N03CB uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.



Features

- V_{DS} =30V, I_D = 13.8A
  $R_{DS(on)}$ < 7.5mΩ @ V_{GS} = 10V
  $R_{DS(on)}$ < 10mΩ @ V_{GS} = 4.5V
- Green Device Available
- High Power and Current Handing Capability



Applications

- Battery Protection
- Power Management
- Load Switch

Absolute Maximum Ratings (T_A = 25°C, unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_A = 25°C	I_D	13.8	A
	T_A = 100°C		8.7	
Pulsed Drain Current[1]		I_{DM}	55.2	A
Single Pulse Avalanche Energy[2]		EAS	24.2	mJ
Total Power Dissipation	T_A = 25°C	P_D	2.2	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient[3]	$R_{\theta JA}$	56.8	°C/W

Electrical Characteristics (T_J = 25°C, unless otherwise noted)

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	30	-	-	V
Gate-body Leakage current		I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T_J=25°C	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V	-	-	1	μA
	T_J=100°C			-	-	100	
Gate-Threshold Voltage		$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1	1.6	2.5	V
Drain-Source on-Resistance[4]		$R_{DS(on)}$	V_{GS} = 10V, I_D = 8A	-	5.7	7.5	mΩ
			V_{GS} = 4.5V, I_D = 6A	-	7.5	10	
Dynamic Characteristics[5]							
Input Capacitance		C_{iss}	V_{DS} = 15V, V_{GS} = 0V, f = 1.0 MHz	-	1195	-	pF
Output Capacitance		C_{oss}		-	188	-	
Reverse Transfer Capacitance		C_{rss}		-	137	-	
Gate Resistance		R_g	f = 1MHz		2.5		Ω
Switching Characteristics[5]							
Total Gate Charge		Q_g	V_{GS} = 10V, V_{DS} = 15V, I_D = 8A	-	21.5	-	nC
Gate-Source Charge		Q_{gs}		-	3.5	-	
Gate-Drain Charge		Q_{gd}		-	4.5	-	
Turn-on Delay Time		$t_{d(on)}$	V_{GS} = 10V, V_{DD} = 15V, I_D = 8A, R_G = 3Ω	-	15.6	-	ns
Rise Time		t_r		-	7.2	-	
Turn-off Delay Time		$t_{d(off)}$		-	31.2	-	
Fall Time		t_f		-	6.8	-	
Drain-Source Body Diode Characteristics							
Diode Forward Voltage[4]		V_{SD}	I_S = 1A, V_{GS} = 0V	-	-	1.2	V
Continuous Source Current	T_A = 25°C	I_S	-	-	-	13.8	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
2. The EAS data shows Max. rating . The test condition is V_{DD}= 20V, V_{GS}= 10V, L= 0.1mH, I_{AS}=22A.
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

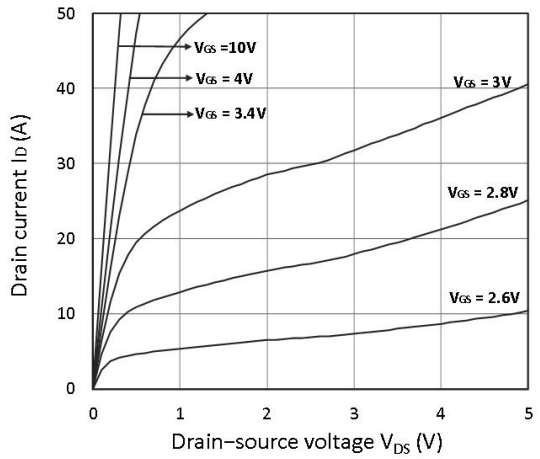


Figure 1. Output Characteristics

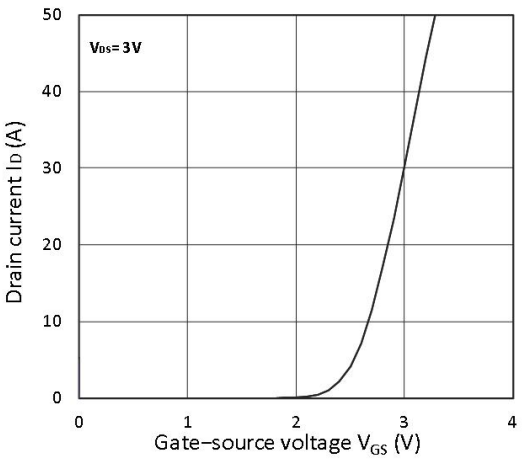


Figure 2. Transfer Characteristics

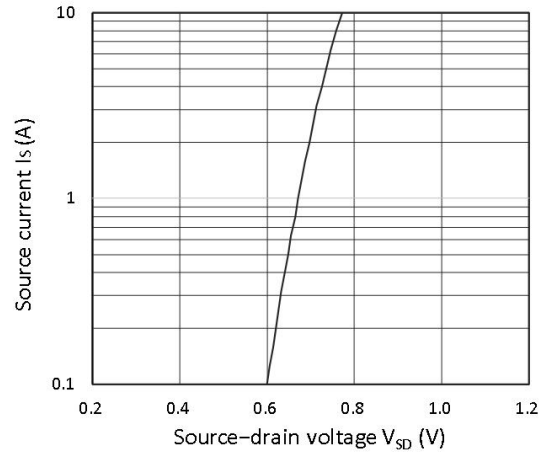


Figure 3. Forward Characteristics of Reverse

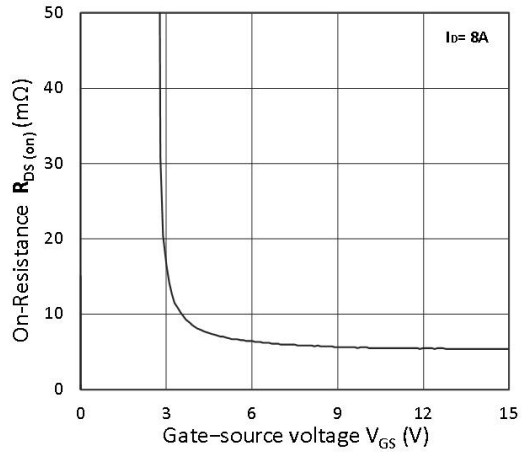


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

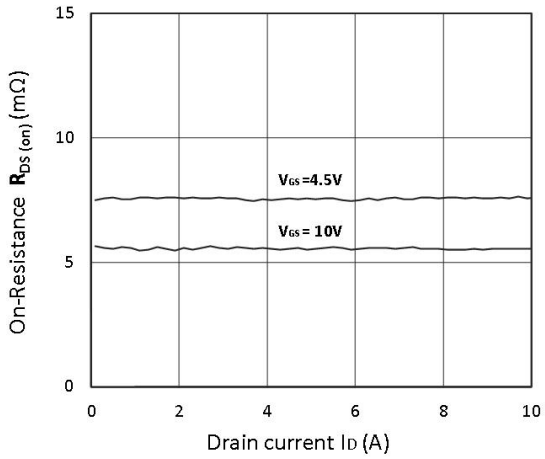


Figure 5. $R_{DS(ON)}$ vs. I_D

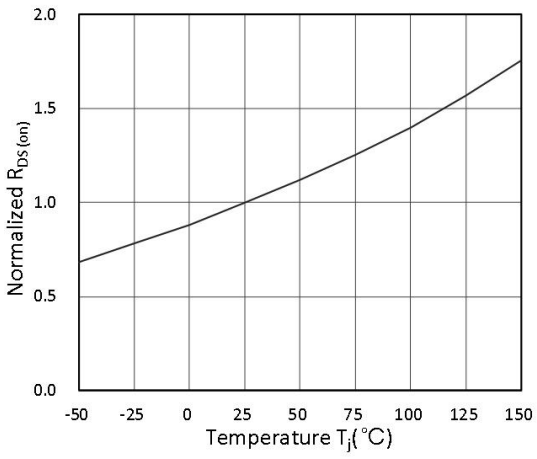


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

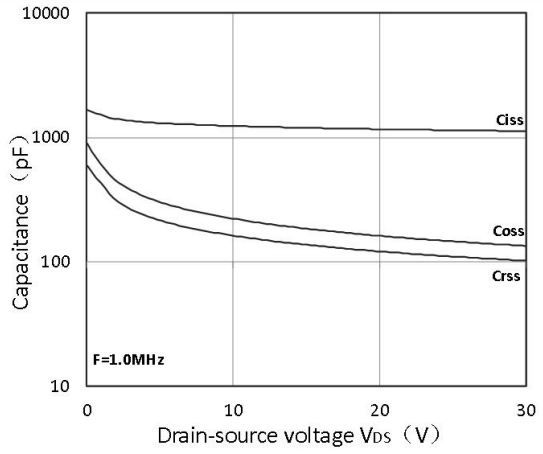


Figure 7. Capacitance Characteristics

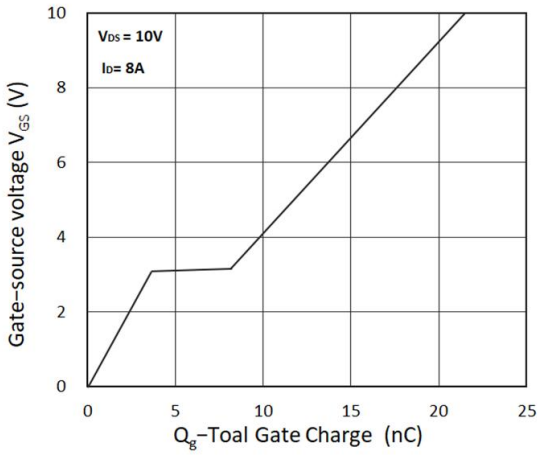


Figure 8. Gate Charge Characteristics

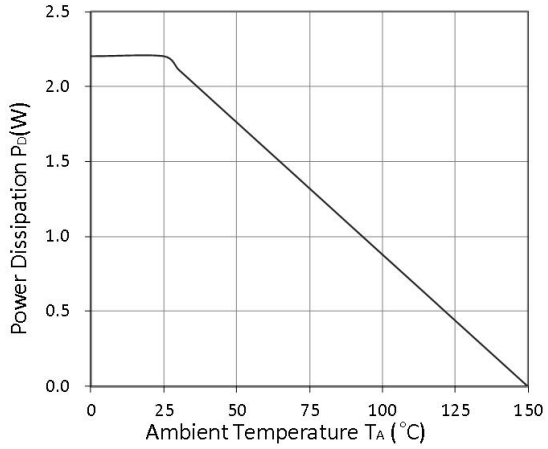


Figure 9. Power Dissipation

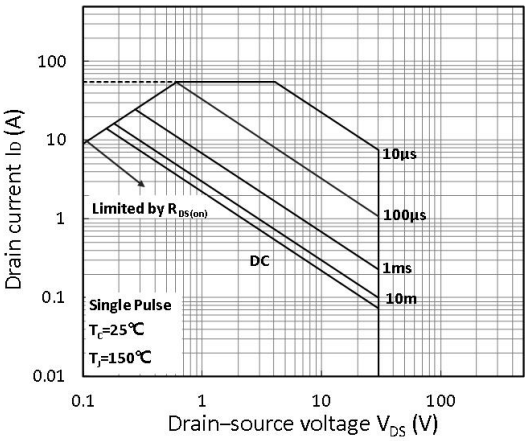


Figure10. Safe Operating Area

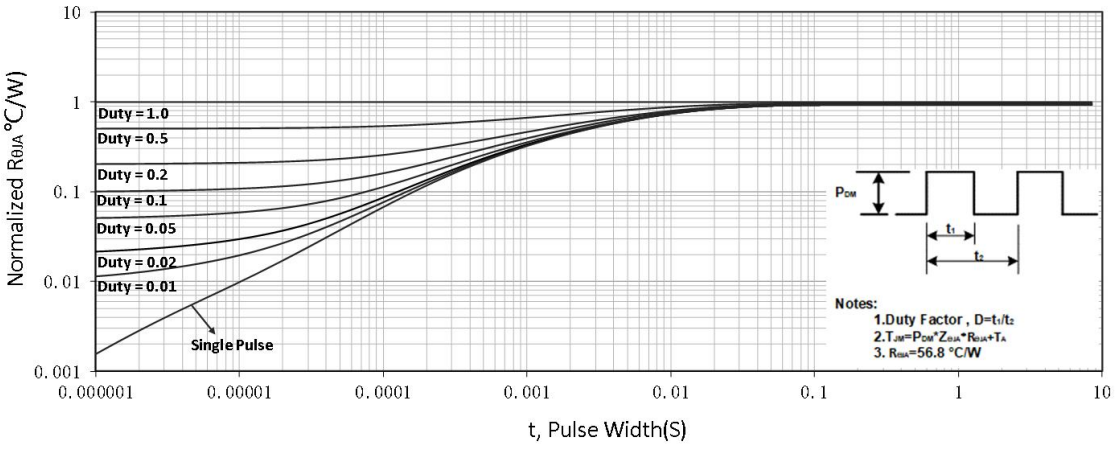


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

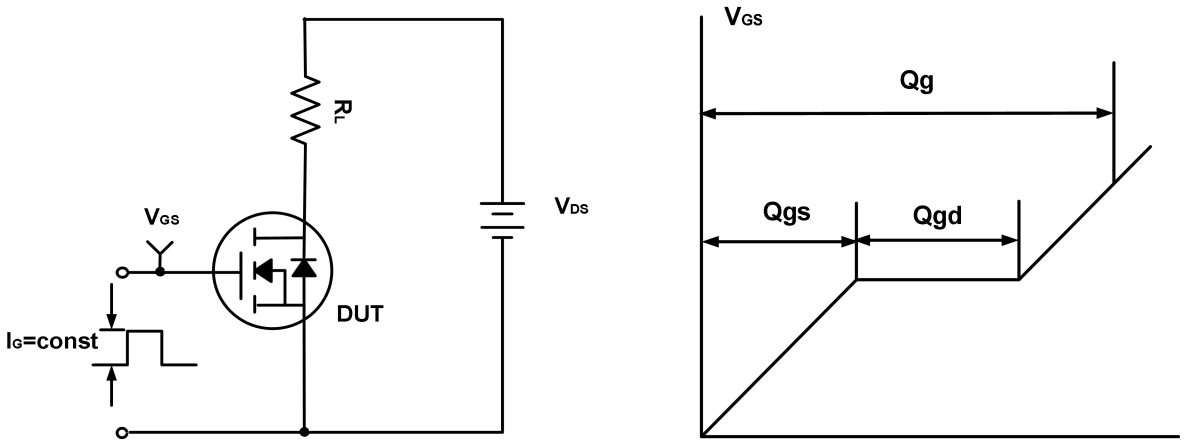


Figure A. Gate Charge Test Circuit & Waveforms

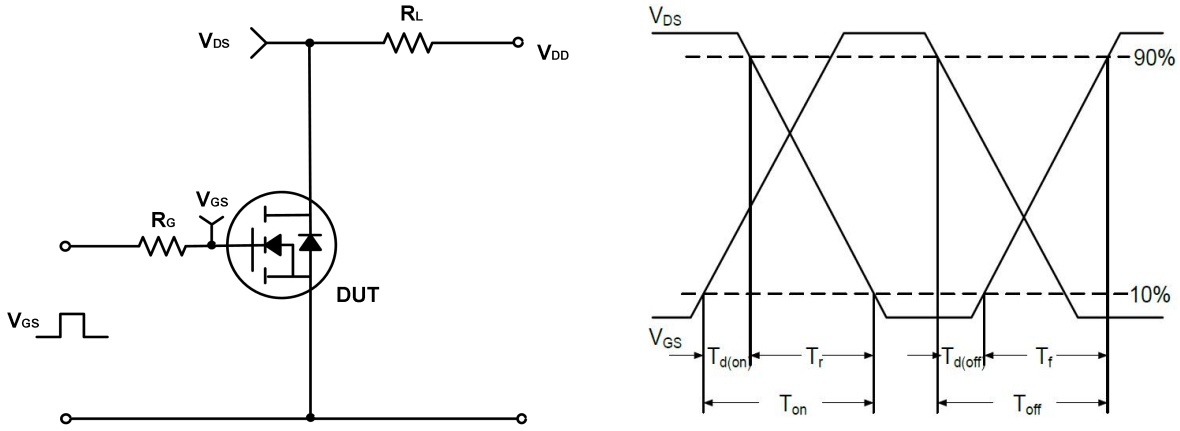


Figure B. Switching Test Circuit & Waveforms

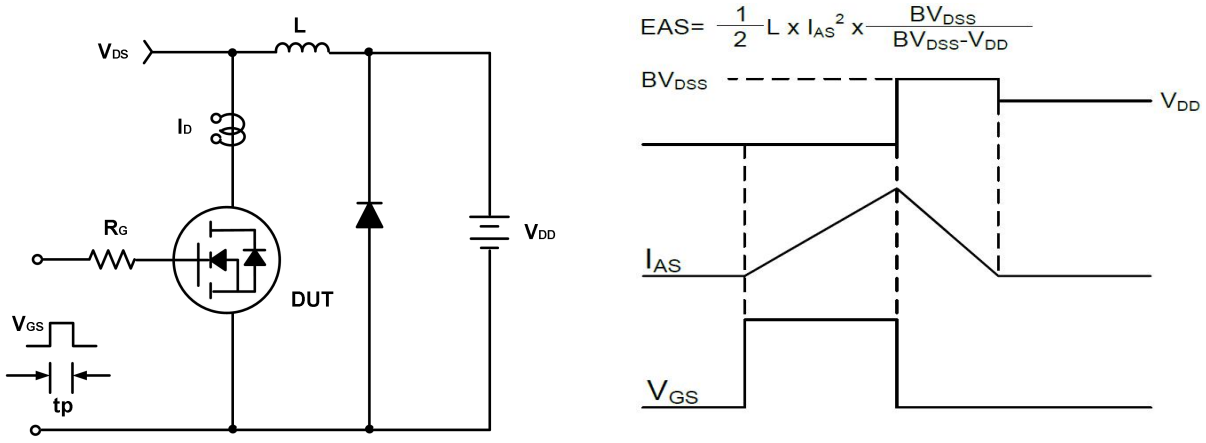
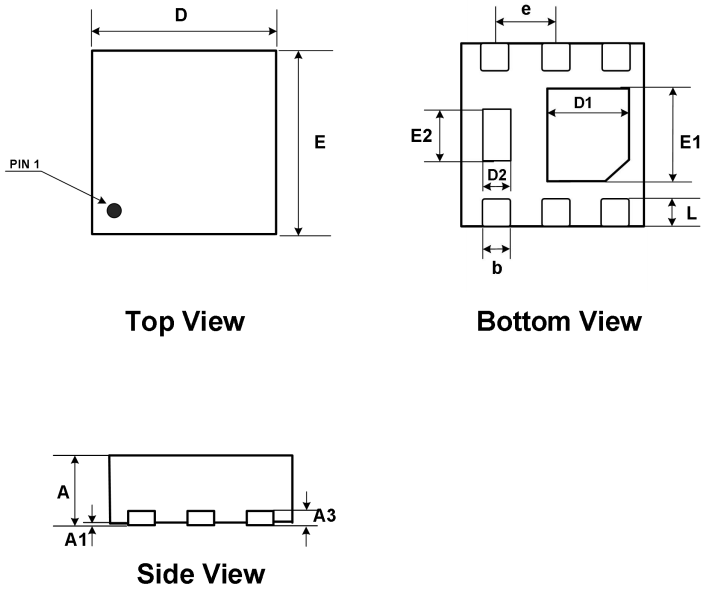


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Mechanical Dimensions for DFN2020-6L

Package Outline



Top View

Bottom View

Side View

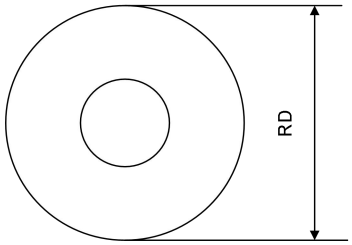
SYMBOL	MM	
	MIN	MAX
A	0.500	0.600
A1	0.000	0.050
A3	0.152REF	
D	1.900	2.100
E	1.900	2.100
D1	0.800	1.000
E1	0.850	1.050
E2	0.460	0.660
D2	0.200	0.400
b	0.250	0.350
e	0.650TYP	
L	0.174	0.326

Marking Information

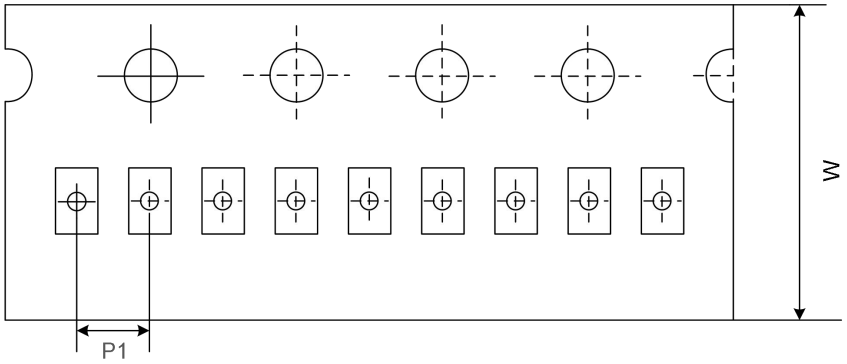
Part Number	Marking
EMR14N03CB	 R14N03B= Device code WWXXXXX= Tracking code

Tape Information

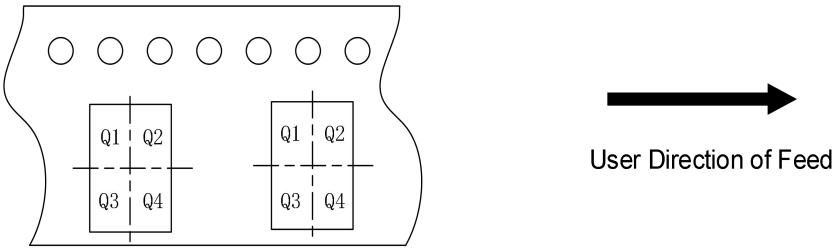
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



RD	Reel Dimensions	7 inch
W	Overall width of the carrier tape	8 mm
P1	Pitch between successive cavity centers	4 mm
Pin1	Pin1 Quadrant	Q2

Revision History

No.	Version	Date	Revision Item	Request	Function and characteristic checking	Package dimension checking	Typos checking
1	1.0	2022-1-10	Initial Version	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying
2	1.1	2022-3-23	Update EC Table	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying