

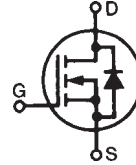
# HiPerFET™ Power MOSFETs Q-Class

N-Channel Enhancement Mode  
Avalanche Rated, High dv/dt, Low Q<sub>g</sub>  
Low intrinsic R<sub>g</sub>, low t<sub>rr</sub>

**IXFK 30N100Q2**  
**IXFX 30N100Q2**

**V<sub>DSS</sub> = 1000 V**  
**I<sub>D25</sub> = 30 A**  
**R<sub>DS(on)</sub> = 0.40 Ω**

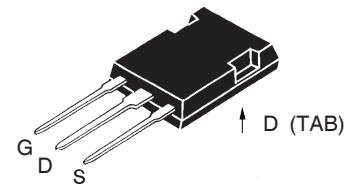
**t<sub>rr</sub> ≤ 300 ns**



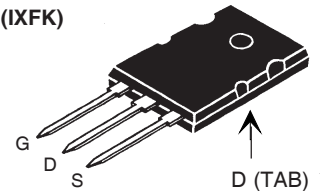
## Preliminary Data Sheet

| Symbol           | Test Conditions   | Maximum Ratings |                 |
|------------------|---|-----------------|-----------------|
| V <sub>DSS</sub> | T <sub>J</sub> = 25°C to 150°C  | 1000            | V               |
| V <sub>DGR</sub> | T <sub>J</sub> = 25°C to 150°C; R <sub>GS</sub> = 1 MΩ  | 1000            | V               |
| V <sub>GS</sub>  | Continuous  | ±30             | V               |
| V <sub>GSM</sub> | Transient   | ±40             | V               |
| I <sub>D25</sub> | T <sub>C</sub> = 25°C   | 30              | A               |
| I <sub>DM</sub>  | T <sub>C</sub> = 25°C, pulse width limited by T <sub>JM</sub>   | 120             | A               |
| I <sub>AR</sub>  | T <sub>C</sub> = 25°C   | 30              | A               |
| E <sub>AR</sub>  | T <sub>C</sub> = 25°C   | 60              | mJ              |
| E <sub>AS</sub>  | T <sub>C</sub> = 25°C   | 4.0             | J               |
| dv/dt            | I <sub>S</sub> ≤ I <sub>DM</sub> , di/dt ≤ 100 A/μs, V <sub>DD</sub> ≤ V <sub>DSS</sub> ,<br>T <sub>J</sub> ≤ 150°C, R <sub>G</sub> = 2 Ω | 20              | V/ns            |
| P <sub>D</sub>   | T <sub>C</sub> = 25°C   | 735             | W               |
| T <sub>J</sub>   |   | -55 ... +150    | °C              |
| T <sub>JM</sub>  |   | 150             | °C              |
| T <sub>stg</sub> |   | -55 ... +150    | °C              |
| T <sub>L</sub>   | 1.6 mm (0.063 in) from case for 10 s  | 300             | °C              |
| M <sub>d</sub>   | Mounting torque   | TO-264          | 0.9/6 Nm/lb.in. |
| Weight           |   | PLUS-247        | 6 g             |
|                  |   | TO-264          | 10 g            |

## PLUS247™ (IXFX)



## TO-264 AA (IXFK)



G = Gate  
S = Source

D = Drain  
TAB = Drain

| Symbol              | Test Conditions   | Characteristic Values<br>(T <sub>J</sub> = 25°C, unless otherwise specified) |      |         |
|---------------------|---|--|------|---------|
|                     |   | min.   | typ. | max.    |
| V <sub>DSS</sub>    | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 3mA   | 1000   |      | V       |
| V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 8 mA   | 2.5  |      | 5.0 V   |
| I <sub>GSS</sub>    | V <sub>GS</sub> = ±20 V <sub>DC</sub> , V <sub>DS</sub> = 0   |  |      | ±200 nA |
| I <sub>DSS</sub>    | V <sub>DS</sub> = V <sub>DSS</sub><br>V <sub>GS</sub> = 0 V   | T <sub>J</sub> = 25°C  |      | 50 μA   |
|                     |   | T <sub>J</sub> = 125°C   |      | 2 mA    |
| R <sub>DS(on)</sub> | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.5 • I <sub>D25</sub><br>Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 % |  |      | 0.40 Ω  |

## Features

- Double metal process for low gate resistance
- International standard packages
- Epoxy meet UL 94 V-0, flammability classification
- Avalanche energy and current rated
- Fast intrinsic Rectifier

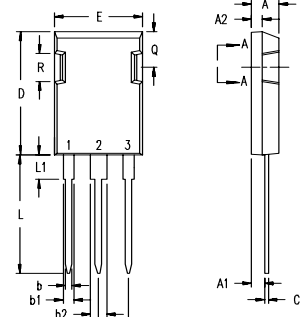
## Advantages

- Easy to mount
- Space savings
- High power density

| Symbol       | Test Conditions  | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |          |
|--------------|--|---|------|----------|
|              |  | min.  | typ. | max.     |
| $g_{fs}$     | $V_{DS} = 15\text{ V}; I_D = 0.5 \cdot I_{D25}$ , pulse test   | 20  | 30   | S        |
| $C_{iss}$    | } $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$  |   | 8200 | pF       |
| $C_{oss}$    |  |   | 760  | pF       |
| $C_{rss}$    |  |   | 140  | pF       |
| $t_{d(on)}$  | } $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$<br>$R_G = 1.0\ \Omega$ (External), |   | 22   | ns       |
| $t_r$        |  |   | 14   | ns       |
| $t_{d(off)}$ |  |   | 60   | ns       |
| $t_f$        |  |   | 10   | ns       |
| $Q_{g(on)}$  | } $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 \cdot I_{D25}$                                    |   | 186  | nC       |
| $Q_{gs}$     |  |   | 46   | nC       |
| $Q_{gd}$     |  |   | 82   | nC       |
| $R_{thJC}$   | TO-264   |   |      | 0.17 K/W |
| $R_{thCK}$   |  |   | 0.15 | K/W      |

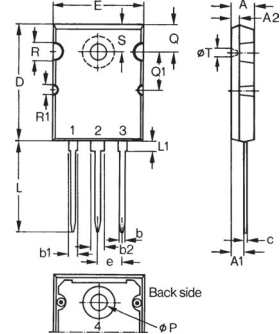
**Source-Drain Diode**

| Symbol   | Test Conditions   | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|----------|---|---|------|---------------|
|          |   | min.  | typ. | max.          |
| $I_S$    | $V_{GS} = 0\text{ V}$   |   |      | 30 A          |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$   |   |      | 120 A         |
| $V_{SD}$ | $I_F = I_S, V_{GS} = 0\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$ |   |      | 1.5 V         |
| $t_{rr}$ | } $I_F = 25\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$                          |   | 1    | 250 ns        |
| $Q_{RM}$ |   |   | 10   | $\mu\text{C}$ |
| $I_{RM}$ |   |   |      | A             |

**PLUS 247™ Outline**


Terminals: 1 - Gate  
 2 - Drain (Collector)  
 3 - Source (Emitter)  
 4 - Drain (Collector)

| Dim.           | Millimeter |       | Inches   |       |
|----------------|------------|-------|----------|-------|
|                | Min.       | Max.  | Min.     | Max.  |
| A              | 4.83       | 5.21  | .190     | .205  |
| A <sub>1</sub> | 2.29       | 2.54  | .090     | .100  |
| A <sub>2</sub> | 1.91       | 2.16  | .075     | .085  |
| b              | 1.14       | 1.40  | .045     | .055  |
| b <sub>1</sub> | 1.91       | 2.13  | .075     | .084  |
| b <sub>2</sub> | 2.92       | 3.12  | .115     | .123  |
| C              | 0.61       | 0.80  | .024     | .031  |
| D              | 20.80      | 21.34 | .819     | .840  |
| E              | 15.75      | 16.13 | .620     | .635  |
| e              | 5.45 BSC   |       | .215 BSC |       |
| L              | 19.81      | 20.32 | .780     | .800  |
| L1             | 3.81       | 4.32  | .150     | .170  |
| Q              | 5.59       | 6.20  | .220     | 0.244 |
| R              | 4.32       | 4.83  | .170     | .190  |

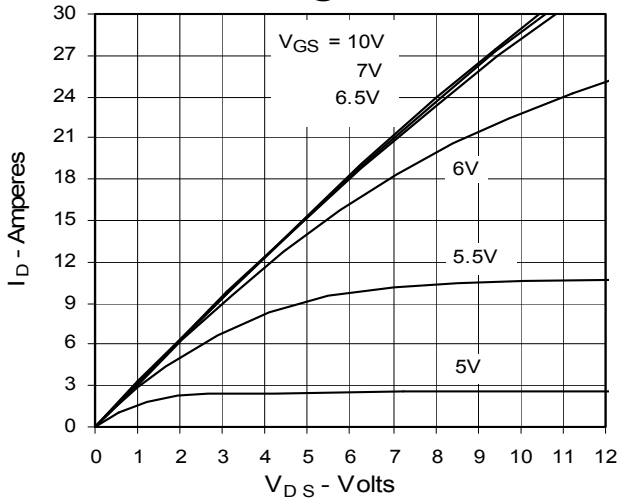
**TO-264 AA Outline**


| Dim. | Millimeter |       | Inches   |       |
|------|------------|-------|----------|-------|
|      | Min.       | Max.  | Min.     | Max.  |
| A    | 4.82       | 5.13  | .190     | .202  |
| A1   | 2.54       | 2.89  | .100     | .114  |
| A2   | 2.00       | 2.10  | .079     | .083  |
| b    | 1.12       | 1.42  | .044     | .056  |
| b1   | 2.39       | 2.69  | .094     | .106  |
| b2   | 2.90       | 3.09  | .114     | .122  |
| c    | 0.53       | 0.83  | .021     | .033  |
| D    | 25.91      | 26.16 | 1.020    | 1.030 |
| E    | 19.81      | 19.96 | .780     | .786  |
| e    | 5.46 BSC   |       | .215 BSC |       |
| J    | 0.00       | 0.25  | .000     | .010  |
| K    | 0.00       | 0.25  | .000     | .010  |
| L    | 20.32      | 20.83 | .800     | .820  |
| L1   | 2.29       | 2.59  | .090     | .102  |
| P    | 3.17       | 3.66  | .125     | .144  |
| Q    | 6.07       | 6.27  | .239     | .247  |
| Q1   | 8.38       | 8.69  | .330     | .342  |
| R    | 3.81       | 4.32  | .150     | .170  |
| R1   | 1.78       | 2.29  | .070     | .090  |
| S    | 6.04       | 6.30  | .238     | .248  |
| T    | 1.57       | 1.83  | .062     | .072  |

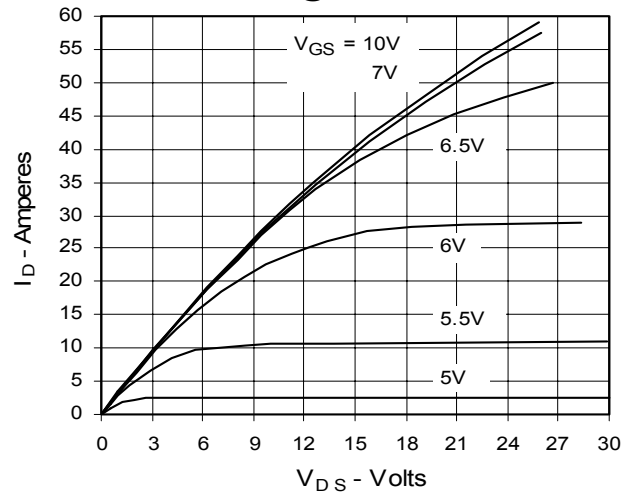
IXYS reserves the right to change limits, test conditions, and dimensions.

|  |           |           |           |           |           |           |             |             |             |           |
|--|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-------------|-------------|-----------|
| IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents: | 4,850,072 | 4,931,844 | 5,034,796 | 5,063,307 | 5,237,481 | 5,381,025 | 6,404,065B1 | 6,162,665   | 6,534,343   | 6,583,505 |
|  | 4,835,592 | 4,881,106 | 5,017,508 | 5,049,961 | 5,187,117 | 5,486,715 | 6,306,728B1 | 6,259,123B1 | 6,306,728B1 | 6,683,344 |

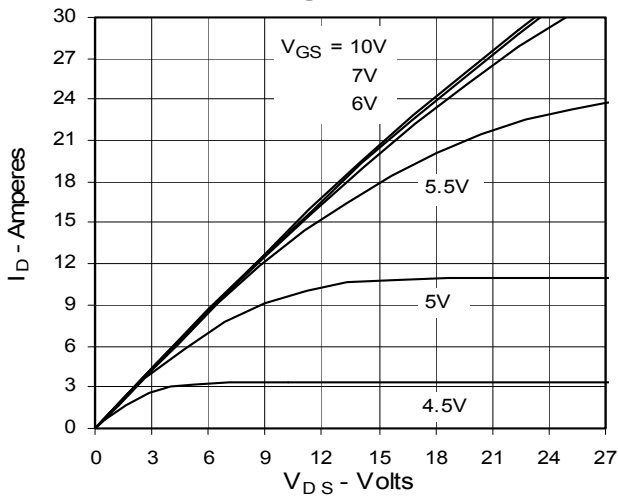
**Fig. 1. Output Characteristics @ 25°C**



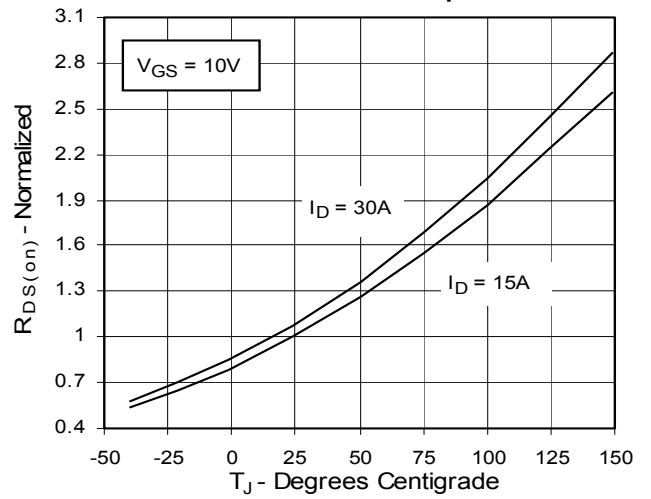
**Fig. 2. Extended Output Characteristics @ 25°C**



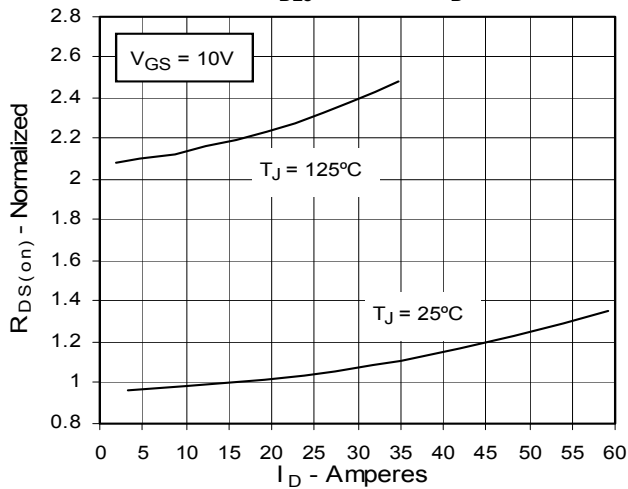
**Fig. 3. Output Characteristics @ 125°C**



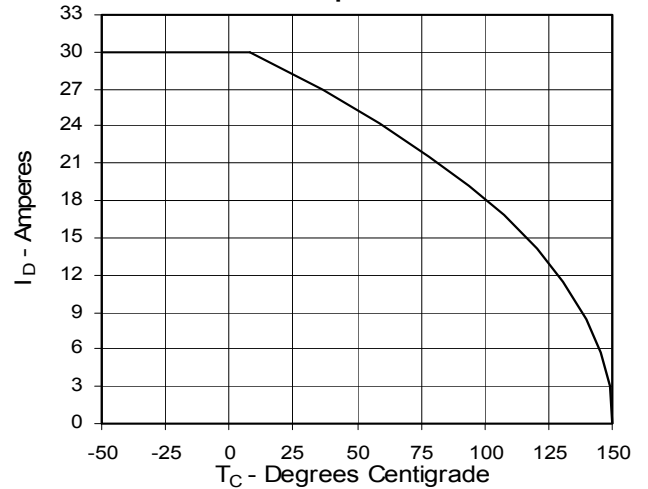
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Junction Temperature**



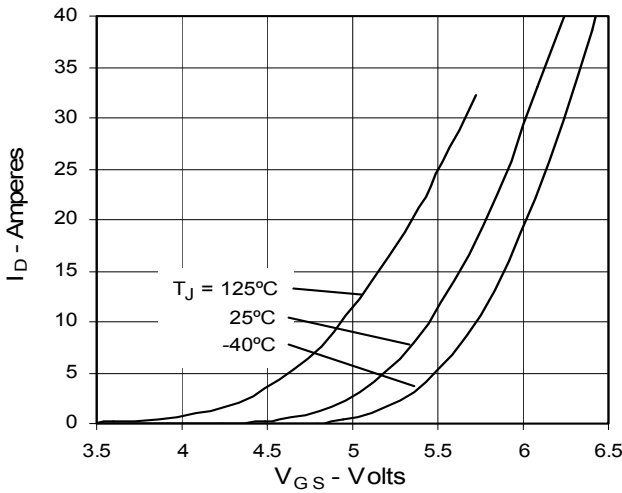
**Fig. 5.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs.  $I_D$**



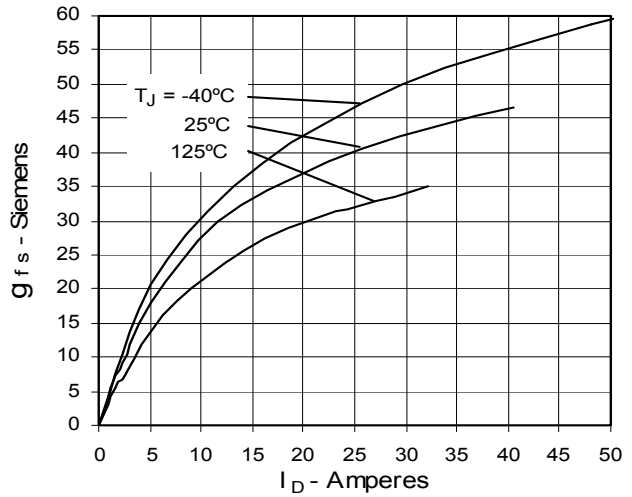
**Fig. 6. Drain Current vs. Case Temperature**



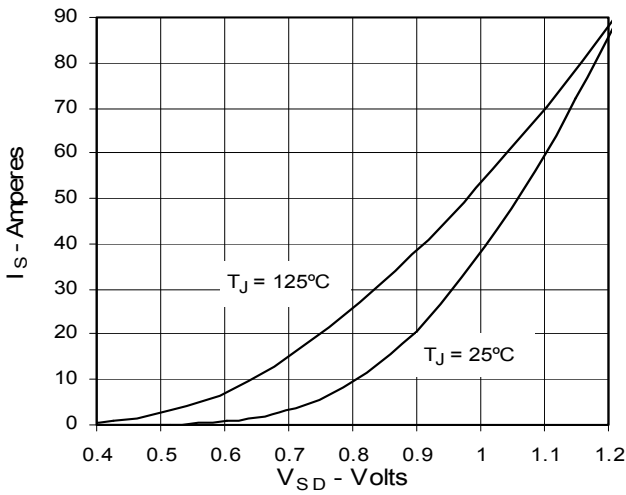
**Fig. 7. Input Admittance**



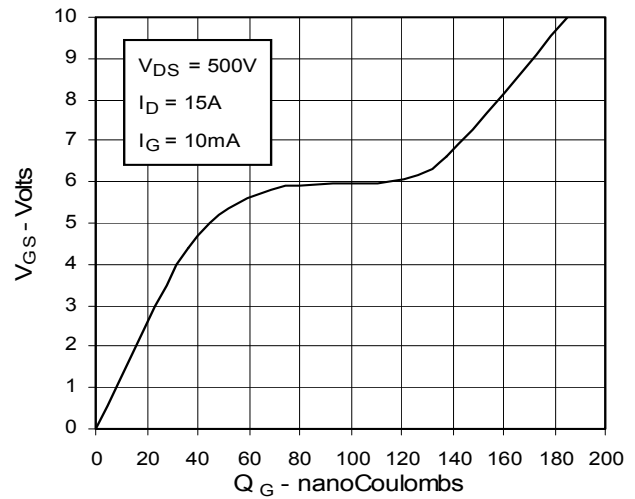
**Fig. 8. Transconductance**



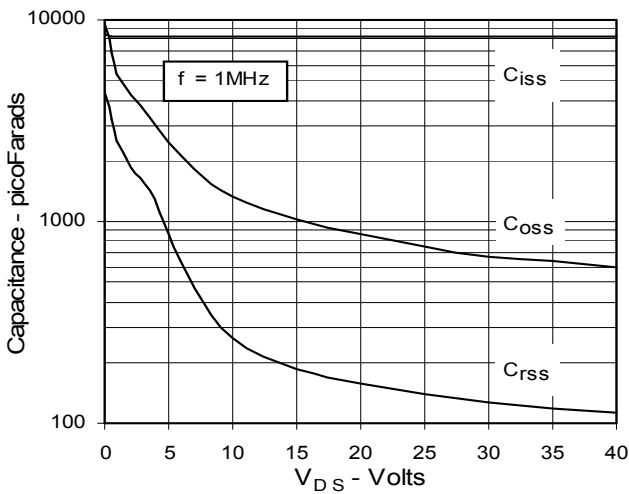
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



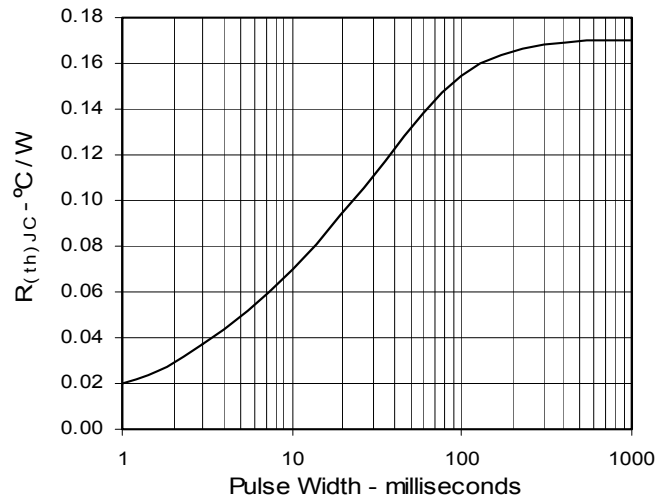
**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Maximum Transient Thermal Resistance**



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|           |           |           |           |           |           |             |             |             |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-------------|-------------|-----------|
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| 4,835,592 | 4,881,106 | 5,017,508 | 5,049,961 | 5,187,117 | 5,486,715 | 6,306,728B1 | 6,259,123B1 | 6,306,728B1 | 6,683,344 |