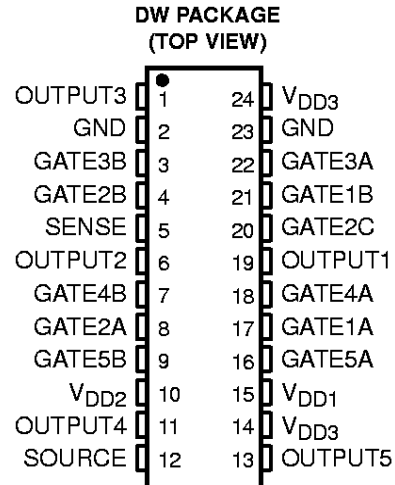


# TPIC1533 QUAD AND HEX POWER DMOS ARRAY

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- **Low  $r_{DS(on)}$ :**  
0.1  $\Omega$  Typ (Full H-Bridge)  
0.22  $\Omega$  Typ (Triple Half H-Bridge)
- **Pulsed Current:**  
12 A Per Channel (Full H-Bridge)  
6 A Per Channel (Triple Half H-Bridge)
- **Matched Sense Transistors for Class A-B Linear Operation**
- **Fast Commutation Speed**

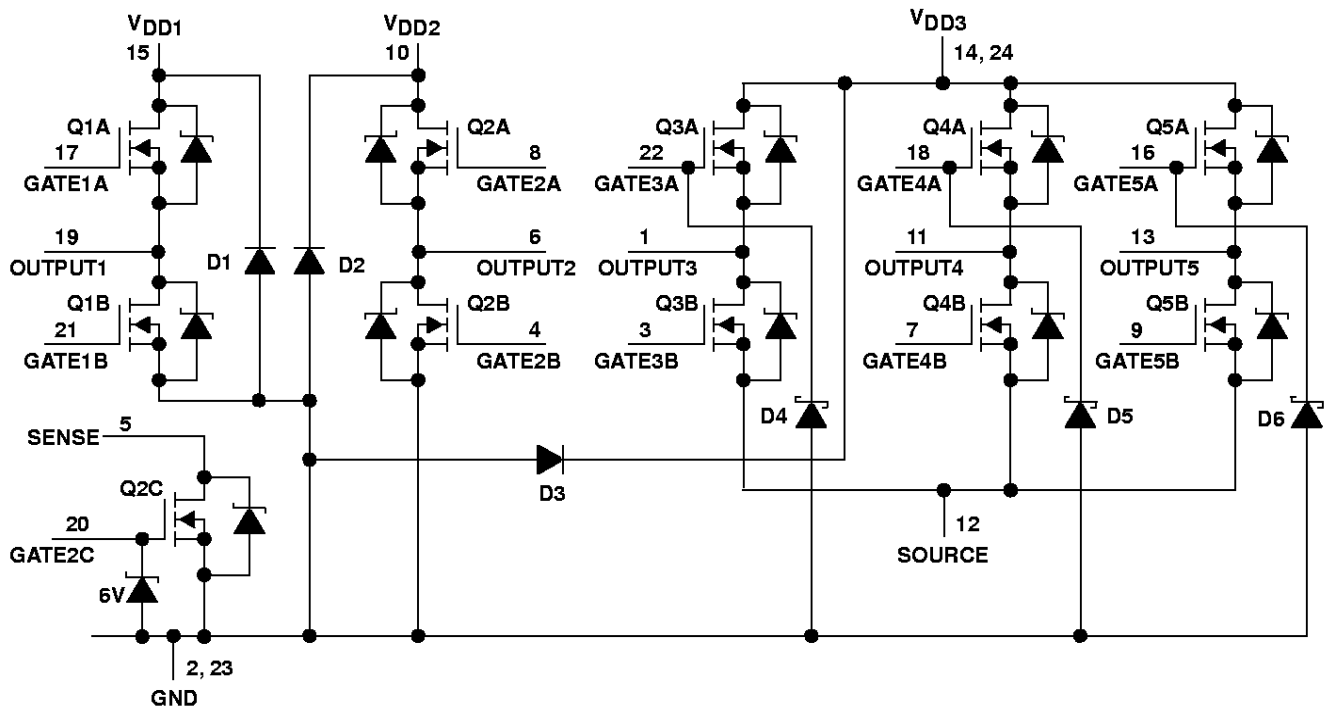


## description

The TPIC1533 is a monolithic power DMOS array that consists of ten electrically isolated N-channel enhancement-mode power DMOS transistors, four of which are configured as a full H-bridge and six as a triple half H-bridge. The lower stage of the full H-bridge is provided with an integrated sense-FET to allow biasing of the bridge in class A-B operation.

The TPIC1533 is offered in a 24-pin wide-body surface-mount (DW) package and is characterized for operation over the case temperature range of -40°C to 125°C.

## schematic



- NOTES:
- A. Terminals 2 and 23 must be externally connected.
  - B. Terminals 14 and 24 must be externally connected.
  - C. No output may be taken greater than 0.5 V below GND.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS  
INSTRUMENTS**

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# TPIC1533

## QUAD AND HEX POWER DMOS ARRAY

SLIS064 – OCTOBER 1996

### absolute maximum ratings, $T_C = 25^\circ\text{C}$ (unless otherwise noted)†

|   |  |
|---|--|
| Supply-to-GND voltage   | 20 V                                       |
| Source-to-GND voltage (Q3A, Q4A, Q5A)   | 20 V                                       |
| Output-to-GND voltage   | 20 V                                       |
| Sense-to-GND voltage  | 20 V                                       |
| Gate-to-source voltage range, $V_{GS}$ (Q1A, Q1B, Q2A, Q2B)   | $\pm 20$ V                                 |
| Gate-to-source voltage range, $V_{GS}$ (Q3A, Q3B, Q4A, Q4B, Q5A, Q5B)                                     | -0.3 V to 20 V                             |
| Gate-to-source voltage, $V_{GS}$ (Q2C)  | -0.7 V to 6 V                              |
| Continuous gate-to-source zener-diode current (Q2C)   | $\pm 10$ mA                                |
| Pulsed gate-to-source zener-diode current (Q2C)   | $\pm 50$ mA                                |
| Continuous drain current, each output (Q1A, Q1B, Q2A, Q2B)  | 3 A  |
| Continuous drain current, each output (Q3A, Q3B, Q4A, Q4B, Q5A, Q5B)                                      | 1.5 A                                      |
| Continuous drain current (Q2C)  | 15 mA                                      |
| Continuous source-to-drain diode current (Q1A, Q1B, Q2A, Q2B)   | 3 A  |
| Continuous source-to-drain diode current (Q3A, Q3B, Q4A, Q4B, Q5A, Q5B)                                   | 1.5 A                                      |
| Continuous source-to-drain diode current (Q2C)  | 15 mA                                      |
| Pulsed drain current, each output, $I_{max}$ (Q1A, Q1B, Q2A, Q2B) (see Note 1 and Figure 24)              | 12 A                                       |
| Pulsed drain current, each output, $I_{max}$ (Q3A, Q3B, Q4A, Q4B, Q5A, Q5B)<br>(see Note 1 and Figure 25) | 6 A  |
| Pulsed drain current, each output, $I_{max}$ (Q2C) (see Note 1)   | 60 mA                                      |
| Continuous total power dissipation, $T_C = 70^\circ\text{C}$ (see Note 2 and Figures 24 and 25)           | 2.86 W                                     |
| Operating virtual junction temperature range, $T_J$   | $-40^\circ\text{C}$ to $150^\circ\text{C}$ |
| Operating case temperature range, $T_C$   | $-40^\circ\text{C}$ to $125^\circ\text{C}$ |
| Storage temperature range, $T_{stg}$  | $-65^\circ\text{C}$ to $150^\circ\text{C}$ |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds  | $260^\circ\text{C}$                        |

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. Pulse duration = 10 ms, duty cycle = 2%

2. Package mounted in intimate contact with infinite heatsink.



# TPIC1533 QUAD AND HEX POWER DMOS ARRAY

SLIS064 – OCTOBER 1996

## electrical characteristics, Q1A, Q1B, Q2A, Q2B, $T_C = 25^\circ\text{C}$ (unless otherwise noted)

| PARAMETER         |  | TEST CONDITIONS   | MIN                       | TYP  | MAX  | UNIT          |
|-------------------|--|---|---------------------------|------|------|---------------|
| $V_{(BR)DSX}$     | Drain-to-source breakdown voltage  | $I_D = 250 \mu\text{A}$ ,<br>$V_{GS} = 0$   | 20                        |      |      | V             |
| $V_{GS(th)}$      | Gate-to-source threshold voltage   | $I_D = 1 \text{ mA}$ ,<br>See Figure 5  | 1.4                       | 1.7  | 2.1  | V             |
|                   |  | $I_D = 5 \text{ mA}$ ,<br>$V_{DS} = V_{GS}$   | 1.65                      | 1.95 | 2.35 |               |
| $V_{GS(th)match}$ | Gate-to-source threshold voltage matching  | $I_D = 5 \text{ mA}$ ,<br>$V_{DS} = V_{GS}$   |                           |      | 75   | mV            |
| $V_{(BR)}$        | Reverse drain-to-GND breakdown voltage   | Drain-to-GND current = $250 \mu\text{A}$<br>(D1, D2)                                    | 20                        |      |      | V             |
| $V_{(BR)GS}$      | Gate-to-source breakdown voltage, Q2C  | $I_{GS} = 100 \mu\text{A}$  | 6                         |      |      | V             |
| $V_{(BR)SG}$      | Source-to-gate breakdown voltage, Q2C  | $I_{SG} = 100 \mu\text{A}$  | 0.7                       |      |      | V             |
| $V_{DS(on)}$      | Drain-to-source on-state voltage   | $I_D = 3 \text{ A}$ ,<br>See Notes 3 and 4  |                           | 0.3  | 0.36 | V             |
| $V_F$             | Forward on-state voltage, GND-to- $V_{DD1}$ ,<br>GND-to- $V_{DD2}$               | $I_D = 3 \text{ A}$ (D1, D2)<br>See Notes 3 and 4                                       |                           | 1.8  |      | V             |
| $V_{F(SD)}$       | Forward on-state voltage, source-to-drain  | $I_S = 2 \text{ A}$ ,<br>See Notes 3 and 4 and Figure 19                                |                           | 1    | 1.2  | V             |
|                   |  | $I_S = 3 \text{ A}$ ,<br>See Notes 3 and 4 and Figure 19                                |                           | 1.1  | 1.3  |               |
| $I_{DSS}$         | Zero-gate-voltage drain current  | $V_{DS} = 16 \text{ V}$ ,<br>$V_{GS} = 0$   | $T_C = 25^\circ\text{C}$  | 0.05 | 1    | $\mu\text{A}$ |
|                   |  |   | $T_C = 125^\circ\text{C}$ | 0.5  | 10   |               |
| $I_{GSSF}$        | Forward gate current, drain short-circuited<br>to source                         | $V_{GS} = 16 \text{ V}$ ,<br>$V_{DS} = 0$   |                           | 10   | 100  | nA            |
| $I_{GSSR}$        | Reverse gate current, drain short-circuited<br>to source                         | $V_{SG} = 16 \text{ V}$ ,<br>$V_{DS} = 0$   |                           | 10   | 100  | nA            |
| $I_{lkg}$         | Leakage current, $V_{DD1}$ -to-GND, $V_{DD2}$ -to-GND,<br>gate shorted to source | $V_{DGND} = 16 \text{ V}$   | $T_C = 25^\circ\text{C}$  | 0.05 | 1    | $\mu\text{A}$ |
|                   |  |   | $T_C = 125^\circ\text{C}$ | 0.5  | 10   |               |
| $r_{DS(on)}$      | Static drain-to-source on-state resistance                                       | $V_{GS} = 10 \text{ V}$ ,<br>$I_D = 2 \text{ A}$ ,<br>See Notes 3 and 4<br>and Figure 9 | $T_C = 25^\circ\text{C}$  | 0.1  | 0.12 | $\Omega$      |
|                   |  |   | $T_C = 125^\circ\text{C}$ | 0.14 | 0.18 |               |
|                   |  |   | $T_C = 25^\circ\text{C}$  | 0.1  | 0.12 |               |
|                   |  |   | $T_C = 125^\circ\text{C}$ | 0.14 | 0.18 |               |
| $g_{fs}$          | Forward transconductance   | $V_{DS} = 14 \text{ V}$ ,<br>See Notes 3 and 4  | $I_D = 1 \text{ A}$ ,     | 1.5  | 2.5  | S             |
|                   |  | $V_{DS} = 14 \text{ V}$ ,<br>See Notes 3 and 4 and Figure 13                            | $I_D = 1.5 \text{ A}$ ,   | 2    | 3    |               |
| $C_{iss}$         | Short-circuit input capacitance, common source                                   | $V_{DS} = 14 \text{ V}$ ,<br>$f = 1 \text{ MHz}$ ,<br>$V_{GS} = 0$ ,<br>See Figure 17   |                           | 240  |      | pF            |
| $C_{oss}$         | Short-circuit output capacitance, common<br>source                               |   |                           | 170  |      |               |
| $C_{rss}$         | Short-circuit reverse transfer capacitance,<br>common source                     |   |                           | 130  |      |               |
| $\alpha_s$        | Sense-FET drain current ratio  | $V_{DS} = 6 \text{ V}$ ,<br>$I_{D(Q2C)} = 40 \mu\text{A}$                               | 100                       | 150  | 200  |               |

NOTES: 3. Technique should limit  $T_J - T_C$  to  $10^\circ\text{C}$  maximum.  
4. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts.



# TPIC1533

## QUAD AND HEX POWER DMOS ARRAY

SLIS064 – OCTOBER 1996

### source-to-drain diode characteristics, Q1A, Q2A, $T_C = 25^\circ\text{C}$

| PARAMETER |                       | TEST CONDITIONS  | MIN | TYP | MAX | UNIT |
|-----------|-----------------------|--|-----|-----|-----|------|
| $t_{rr}$  | Reverse-recovery time | $I_S = 1.5\text{ A}$ ,<br>$V_{DS} = 14\text{ V}$ ,<br>See Figures 1 and 23 |     | 70  |     | ns   |
| $Q_{RR}$  | Total diode charge    |  |     | 90  |     | nC   |
| $t_{rr}$  | Reverse-recovery time | $I_S = 2\text{ A}$ ,<br>$V_{DS} = 14\text{ V}$                             |     | 75  |     | ns   |
| $Q_{RR}$  | Total diode charge    |  |     | 110 |     | nC   |

### resistive-load switching characteristics, Q1A, Q1B, Q2A, Q2B, $T_C = 25^\circ\text{C}$

| PARAMETER    |                                 | TEST CONDITIONS   | MIN  | TYP  | MAX | UNIT     |     |
|--------------|---------------------------------|---|--|------|-----|----------|-----|
| $t_{d(on)}$  | Turn-on delay time              | $V_{DD} = 14\text{ V}$ ,<br>$R_L = 9.1\ \Omega$ ,<br>$t_{dis} = 10\text{ ns}$ ,<br>See Figure 3 |  | 20   |     | ns       |     |
| $t_{d(off)}$ | Turn-off delay time             |   |  | 30   |     |          |     |
| $t_r$        | Rise time                       |   |  | 15   |     |          |     |
| $t_f$        | Fall time                       |   |  | 25   |     |          |     |
| $Q_g$        | Total gate charge               | $V_{DS} = 14\text{ V}$ ,<br>See Figure 4  |  | 5.6  | 7   | nC       |     |
| $Q_{gs(th)}$ | Threshold gate-to-source charge |   | $I_D = 1.5\text{ A}$ ,<br>$V_{GS} = 10\text{ V}$ |      | 0.8 |          | 1   |
| $Q_{gd}$     | Gate-to-drain charge            |   |  |      | 1.4 |          | 1.7 |
| $L_D$        | Internal drain inductance       |   |  | 5    |     | nH       |     |
| $L_S$        | Internal source inductance      |   |  | 5    |     |          |     |
| $R_g$        | Internal gate resistance        |   |  | 0.25 |     | $\Omega$ |     |



# TPIC1533 QUAD AND HEX POWER DMOS ARRAY

SLIS064 – OCTOBER 1996

## electrical characteristics, Q3A, Q3B, Q4A, Q4B, Q5A, Q5B, $T_C = 25^\circ\text{C}$ (unless otherwise noted)

| PARAMETER     |   | TEST CONDITIONS                                 |                           | MIN                                       | TYP                       | MAX                      | UNIT          |          |
|---------------|---|---|---------------------------|---|---------------------------|--------------------------|---------------|----------|
| $V_{(BR)DSX}$ | Drain-to-source breakdown voltage   | $I_D = 250 \mu\text{A}$ ,                       | $V_{GS} = 0$              | 20  |                           |                          | V             |          |
| $V_{GS(th)}$  | Gate-to-source threshold voltage  | $I_D = 1 \text{ mA}$ ,                          | $V_{DS} = V_{GS}$ ,       | 1.4                                       | 1.7                       | 2.1                      | V             |          |
|               |   | See Figure 6                                    |                           |   |                           |                          |               |          |
|               |   | $I_D = 5 \text{ mA}$ ,                          | $V_{DS} = V_{GS}$         | 1.65                                      | 1.95                      | 2.35                     |               |          |
| $V_{(BR)}$    | Reverse drain-to-GND breakdown voltage                                    | Drain-to-GND current = $250 \mu\text{A}$ (D3)   |                           | 20  |                           |                          | V             |          |
| $V_{DS(on)}$  | Drain-to-source on-state voltage  | $I_D = 2 \text{ A}$ ,                           | $V_{GS} = 10 \text{ V}$ , |   | 0.44                      | 0.6                      | V             |          |
|               |   | See Notes 3 and 4                               |                           |   |                           |                          |               |          |
| $V_F$         | Forward on-state voltage, GND-to- $V_{DD3}$                               | $I_D = 1.5 \text{ A}$ (D3)<br>See Notes 3 and 4 |                           |   | 1.7                       |                          | V             |          |
| $V_{F(SD)}$   | Forward on-state voltage, source-to-drain                                 | $I_S = 1.5 \text{ A}$ ,                         | $V_{GS} = 0$              |   | 1                         | 1.2                      | V             |          |
|               |   | See Notes 3 and 4 and Figure 20                 |                           |   |                           |                          |               |          |
|               |   | $I_S = 2 \text{ A}$ ,                           | $V_{GS} = 0$              |   | 1.1                       | 1.3                      |               |          |
|               |   | See Notes 3 and 4 and Figure 20                 |                           |   |                           |                          |               |          |
| $V_F$         | Forward on-state voltage, GND-to-GATE 3A,<br>GND-to-GATE4A, GND-to GATE5A | $I_D = 1 \text{ mA}$ (D4, D5, D6)               |                           |   | 0.5                       |                          | V             |          |
| $I_{DSS}$     | Zero-gate-voltage drain current   | $V_{DS} = 16 \text{ V}$ ,                       | $V_{GS} = 0$              | $T_C = 25^\circ\text{C}$                  | 0.05                      | 1                        | $\mu\text{A}$ |          |
|               |   |   |                           | $T_C = 125^\circ\text{C}$                 | 0.5                       | 10                       |               |          |
| $I_{GSSF}$    | Forward gate current, drain short-circuited to source                     | $V_{GS} = 16 \text{ V}$ ,                       | $V_{DS} = 0$              |   | 10                        | 100                      | nA            |          |
| $I_{lkg}$     | Leakage current, $V_{DD3}$ -to-GND, gate shorted to source                | $V_{DGND} = 16 \text{ V}$                       |                           | $T_C = 25^\circ\text{C}$                  | 0.05                      | 1                        | $\mu\text{A}$ |          |
|               |   |   |                           | $T_C = 125^\circ\text{C}$                 | 0.5                       | 10                       |               |          |
| $r_{DS(on)}$  | Static drain-to-source on-state resistance                                | $V_{GS} = 10 \text{ V}$ ,                       | $I_D = 1.5 \text{ A}$ ,   | See Notes 3 and 4<br>and Figures 8 and 10 | $T_C = 25^\circ\text{C}$  | 0.22                     | 0.3           | $\Omega$ |
|               |   |   |                           |   | $T_C = 125^\circ\text{C}$ | 0.32                     | 0.4           |          |
|               |   |   |                           |   | $T_C = 25^\circ\text{C}$  | 0.22                     | 0.3           |          |
|               |   |   |                           |   | $T_C = 125^\circ\text{C}$ | 0.32                     | 0.4           |          |
| $g_{fs}$      | Forward transconductance  | $V_{DS} = 14 \text{ V}$ ,                       | $I_D = 500 \text{ mA}$ ,  | See Notes 3 and 4                         | 0.3                       | 0.8                      | S             |          |
|               |   |   |                           |   | $V_{DS} = 14 \text{ V}$ , | $I_D = 750 \text{ mA}$ , |               | 0.4      |
|               |   |   |                           | See Notes 3 and 4 and Figure 14           |                           |                          |               |          |
| $C_{iss}$     | Short-circuit input capacitance, common source                            |   |                           |   |                           | 120                      | pF            |          |
| $C_{oss}$     | Short-circuit output capacitance, common source                           |   |                           |   |                           | 140                      |               |          |
| $C_{rss}$     | Short-circuit reverse transfer capacitance, common source                 | $V_{DS} = 14 \text{ V}$ ,                       | $V_{GS} = 0$ ,            | See Figure 18                             |                           | 80                       |               |          |
|               |   |   |                           |   |                           |                          |               |          |
|               |   |   |                           |   |                           |                          |               |          |

NOTES: 3: Technique should limit  $T_J - T_C$  to  $10^\circ\text{C}$  maximum.

4: These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts.



# TPIC1533

## QUAD AND HEX POWER DMOS ARRAY

SLIS064 – OCTOBER 1996

### source-to-drain diode characteristics, Q3A, Q4A, Q5A, $T_C = 25^\circ\text{C}$

| PARAMETER |                       | TEST CONDITIONS  | MIN | TYP | MAX | UNIT |
|-----------|-----------------------|--|-----|-----|-----|------|
| $t_{rr}$  | Reverse-recovery time | $I_S = 750\text{ mA}$ ,<br>$V_{DS} = 14\text{ V}$ ,<br>See Figures 2 and 23                              |     | 45  |     | ns   |
| $Q_{RR}$  | Total diode charge    |  |     | 45  |     | nC   |
| $t_{rr}$  | Reverse-recovery time | $I_S = 2\text{ A}$ ,<br>$V_{DS} = 14\text{ V}$ ,<br>$V_{GS} = 0$ ,<br>$di/dt = 100\text{ A}/\mu\text{s}$ |     | 70  |     | ns   |
| $Q_{RR}$  | Total diode charge    |  |     | 100 |     | nC   |

### resistive-load switching characteristics, Q3A, Q3B, Q4A, Q4B, Q5A, Q5B, $T_C = 25^\circ\text{C}$

| PARAMETER    |                                 | TEST CONDITIONS  | MIN   | TYP  | MAX | UNIT |
|--------------|---------------------------------|--|---|------|-----|------|
| $t_{d(on)}$  | Turn-on delay time              | $V_{DD} = 14\text{ V}$ ,<br>$R_L = 18.7\ \Omega$ ,<br>$t_{dis} = 10\text{ ns}$ ,<br>See Figure 3 |   | 18   |     | ns   |
| $t_{d(off)}$ | Turn-off delay time             |  |   | 25   |     |      |
| $t_r$        | Rise time                       |  |   | 13   |     |      |
| $t_f$        | Fall time                       |  |   | 20   |     |      |
| $Q_g$        | Total gate charge               | $V_{DS} = 14\text{ V}$ ,<br>See Figure 4   | $I_D = 750\text{ mA}$ ,<br>$V_{GS} = 10\text{ V}$ | 2.3  | 3.1 | nC   |
| $Q_{gs(th)}$ | Threshold gate-to-source charge |  |   | 0.4  | 0.5 |      |
| $Q_{gd}$     | Gate-to-drain charge            |  |   | 0.6  | 0.9 |      |
| $L_D$        | Internal drain inductance       |  |   | 5    |     | nH   |
| $L_S$        | Internal source inductance      |  |   | 5    |     |      |
| $R_g$        | Internal gate resistance        |  |   | 0.25 |     |      |

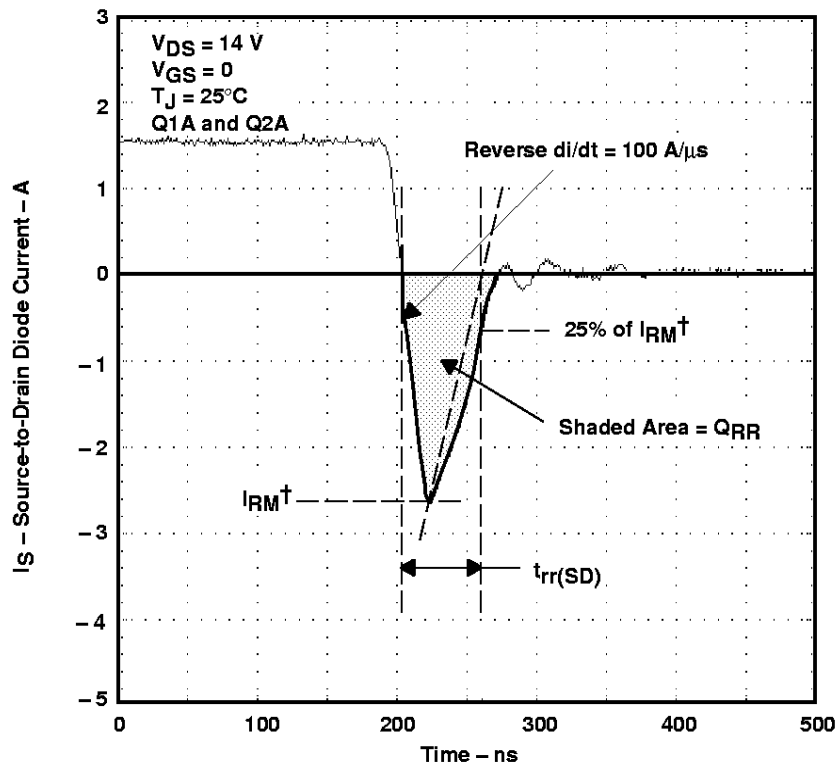
### thermal resistance

| PARAMETER       |  | TEST CONDITIONS   | MIN | TYP | MAX | UNIT                      |
|-----------------|--|-------------------|-----|-----|-----|---------------------------|
| $R_{\theta JA}$ | Junction-to-ambient thermal resistance | See Notes 5 and 8 |     | 90  |     | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JB}$ | Junction-to-board thermal resistance   | See Notes 6 and 8 |     | 38  |     |                           |
| $R_{\theta JP}$ | Junction-to-pin thermal resistance     | See Notes 7 and 8 |     | 28  |     |                           |

- NOTES: 5. Package mounted on a FR4 printed-circuit board with no heat sink.  
 6. Package mounted on a 24 in<sup>2</sup>, 4-layer FR4 printed-circuit board.  
 7. Package mounted in intimate contact with infinite heat sink.  
 8. All outputs with equal power



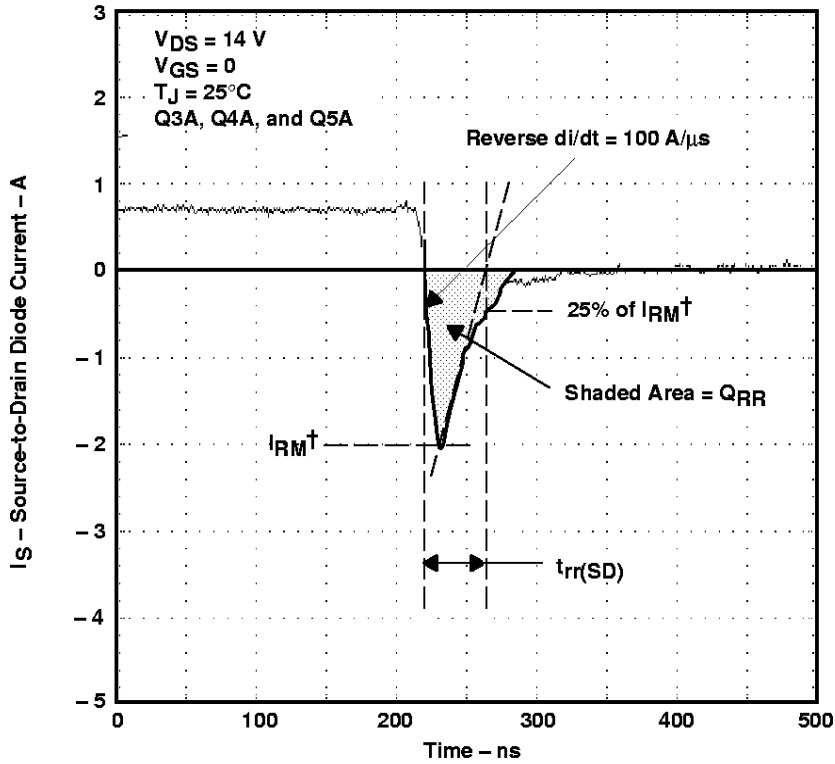
PARAMETER MEASUREMENT INFORMATION



$^\dagger I_{RM}$  = maximum recovery current

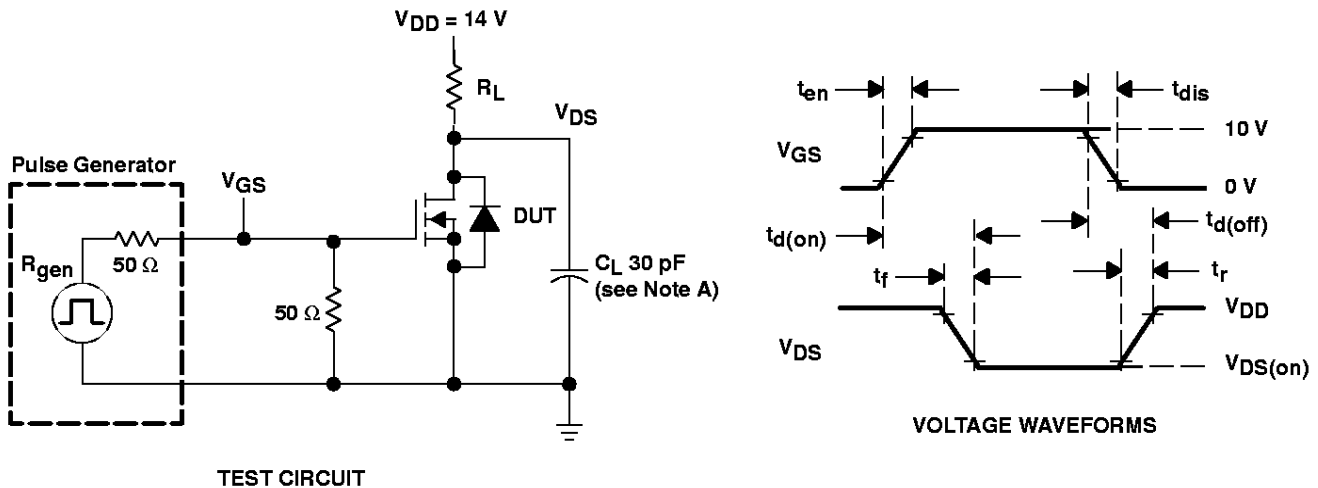
Figure 1. Reverse-Recovery-Current Waveform of Source-to-Drain Diodes

PARAMETER MEASUREMENT INFORMATION



$^\dagger I_{RM}$  = maximum recovery current

Figure 2. Reverse-Recovery-Current Waveform of Source-to-Drain Diodes



TEST CIRCUIT

NOTE A:  $C_L$  includes probe and jig capacitance.

Figure 3. Resistive-Switching Test Circuit and Voltage Waveforms



PARAMETER MEASUREMENT INFORMATION

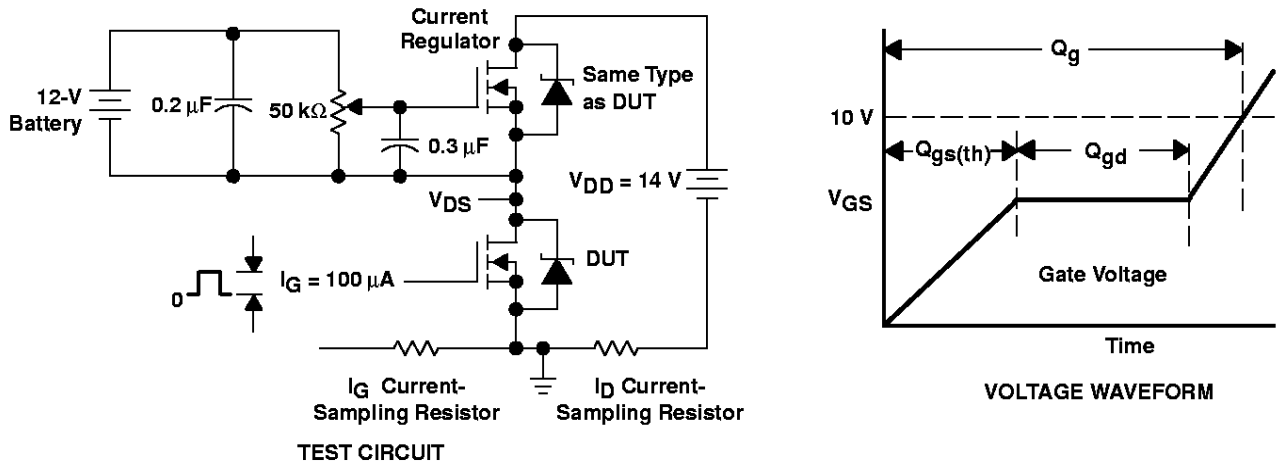


Figure 4. Gate-Charge Test Circuit and Voltage Waveform

TYPICAL CHARACTERISTICS

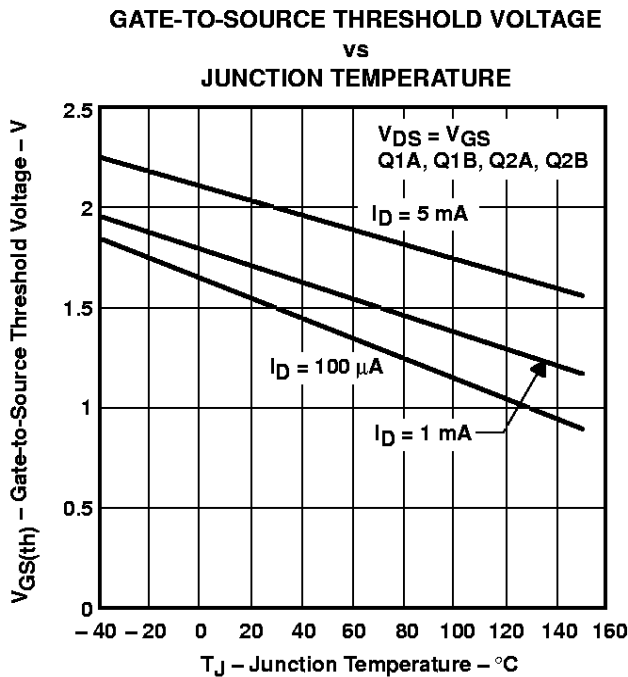


Figure 5

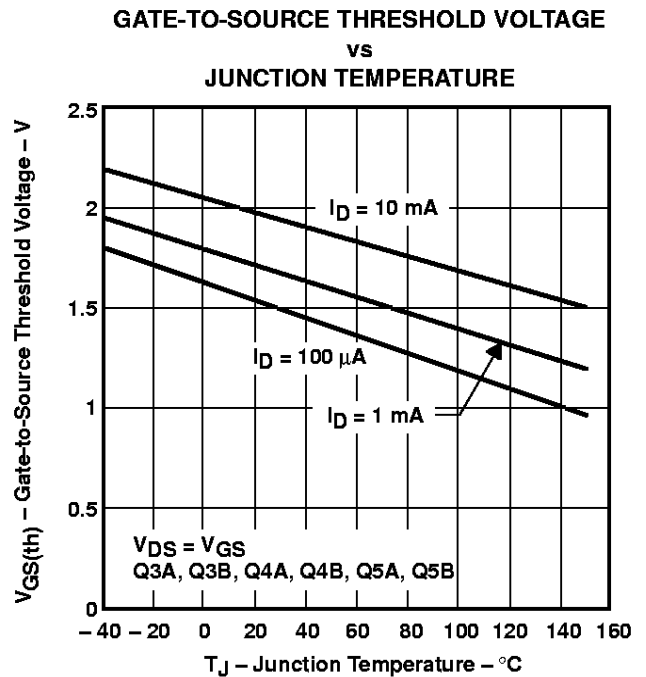


Figure 6

# TPIC1533 QUAD AND HEX POWER DMOS ARRAY

SLIS064 – OCTOBER 1996

## TYPICAL CHARACTERISTICS

STATIC DRAIN-TO-SOURCE  
ON-STATE RESISTANCE  
vs  
JUNCTION TEMPERATURE

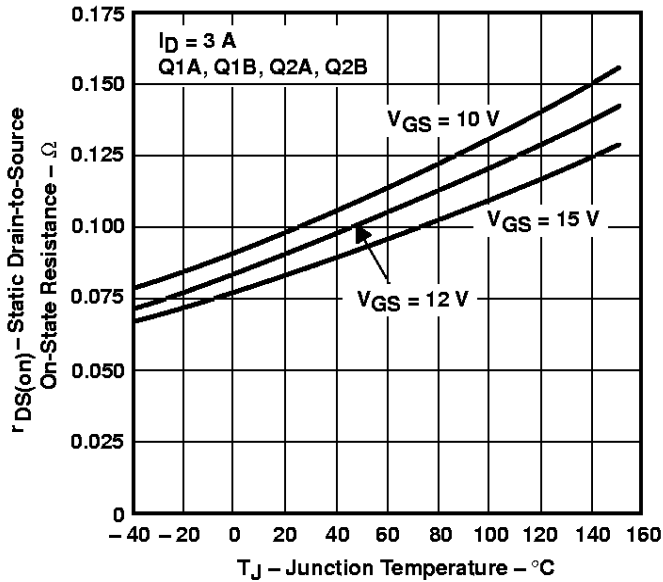


Figure 7

STATIC DRAIN-TO-SOURCE  
ON-STATE RESISTANCE  
vs  
JUNCTION TEMPERATURE

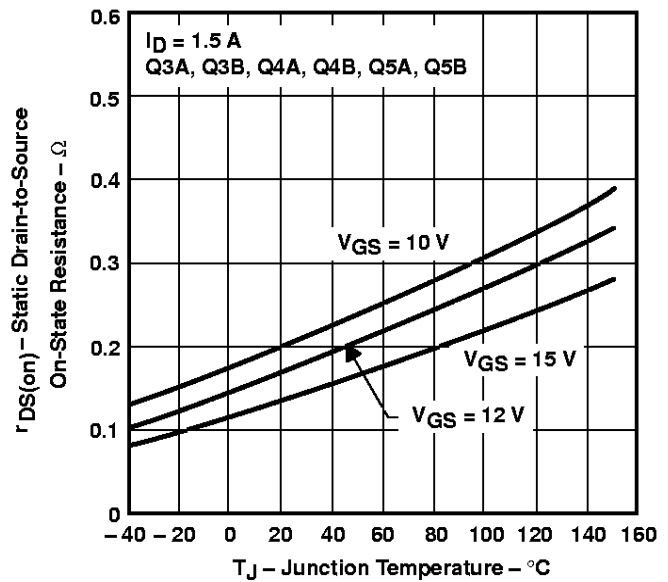


Figure 8

STATIC DRAIN-TO-SOURCE  
ON-STATE RESISTANCE  
vs  
DRAIN CURRENT

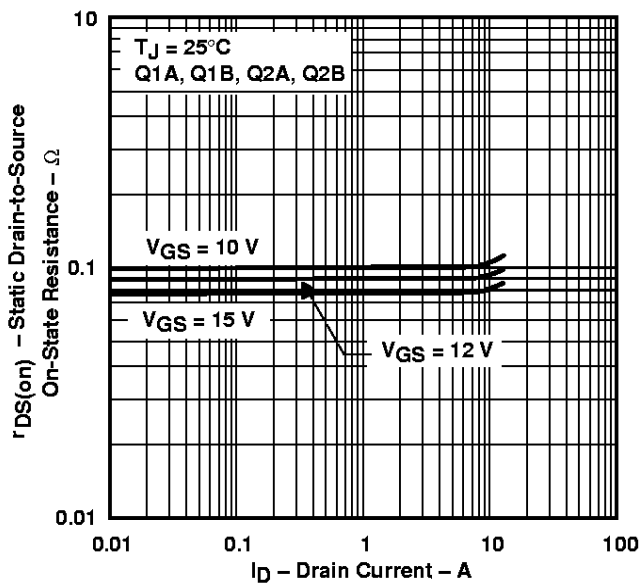


Figure 9

STATIC DRAIN-TO-SOURCE  
ON-STATE RESISTANCE  
vs  
DRAIN CURRENT

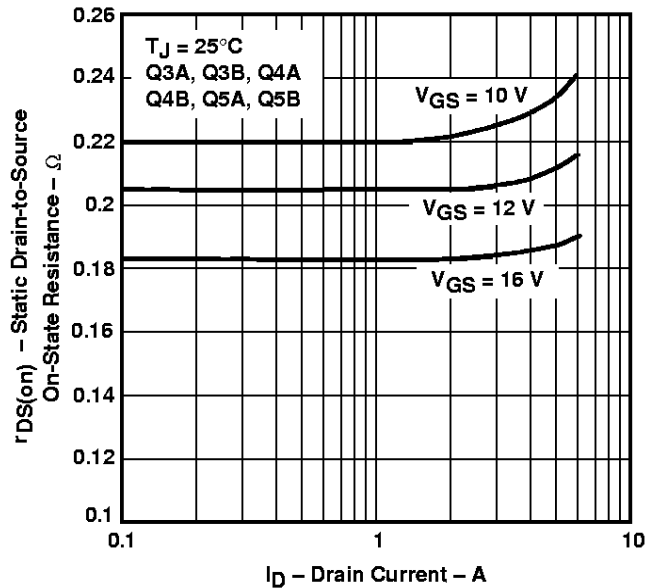
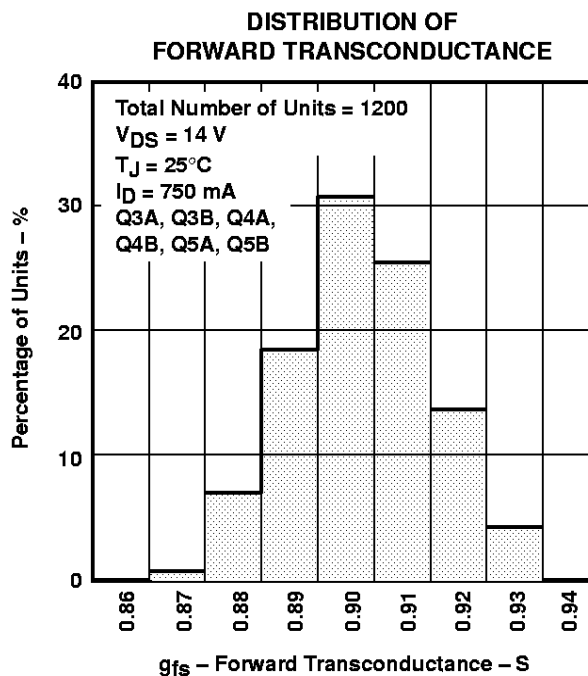
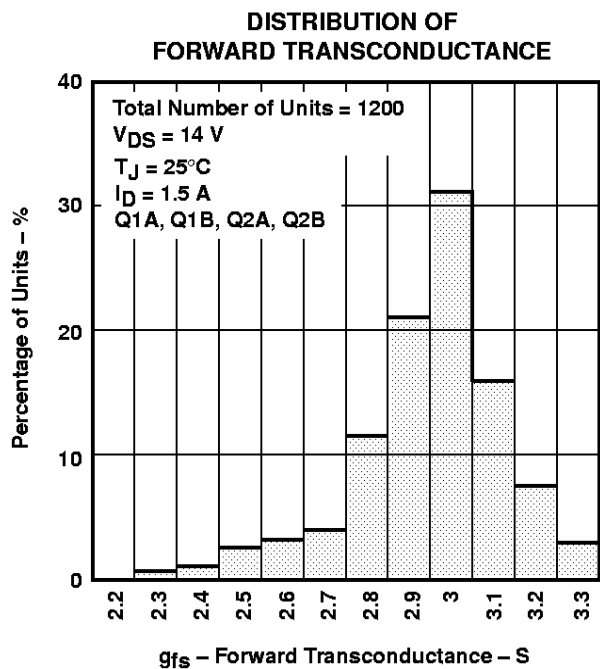
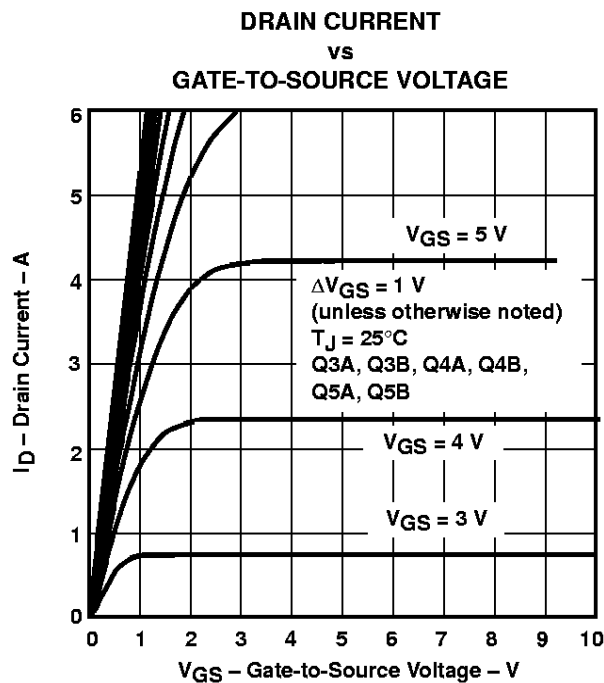
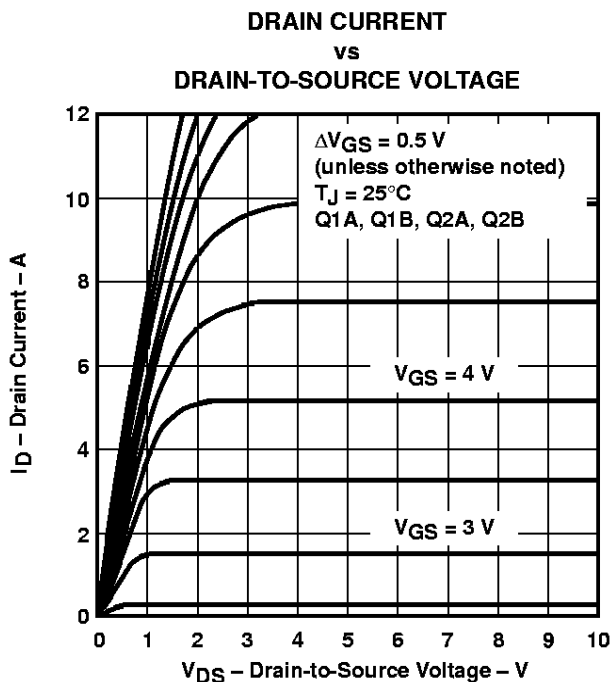


Figure 10



TYPICAL CHARACTERISTICS



# TPIC1533 QUAD AND HEX POWER DMOS ARRAY

SLIS064 – OCTOBER 1996

## TYPICAL CHARACTERISTICS

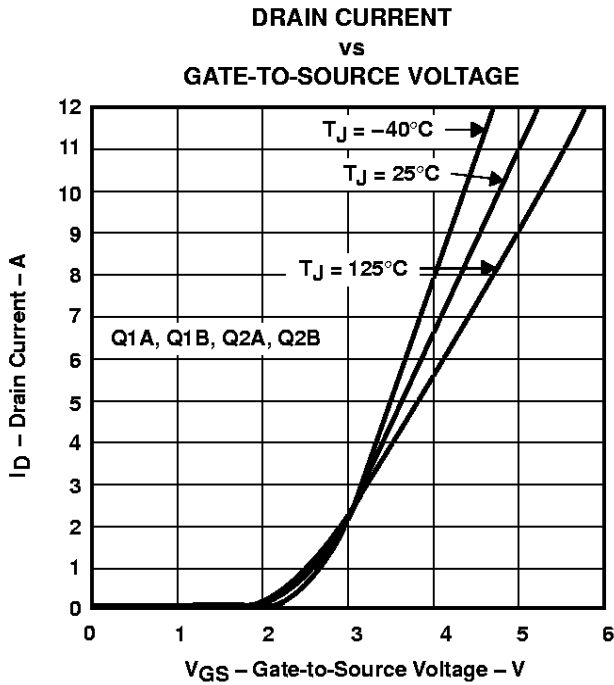


Figure 15

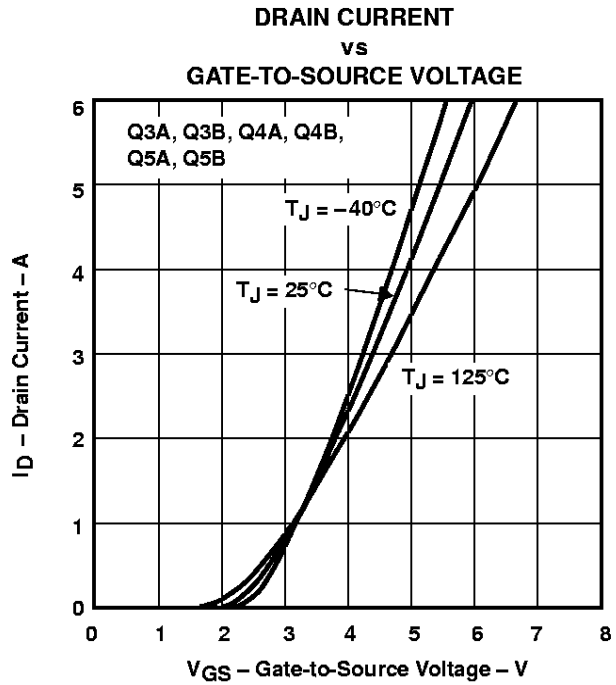


Figure 16

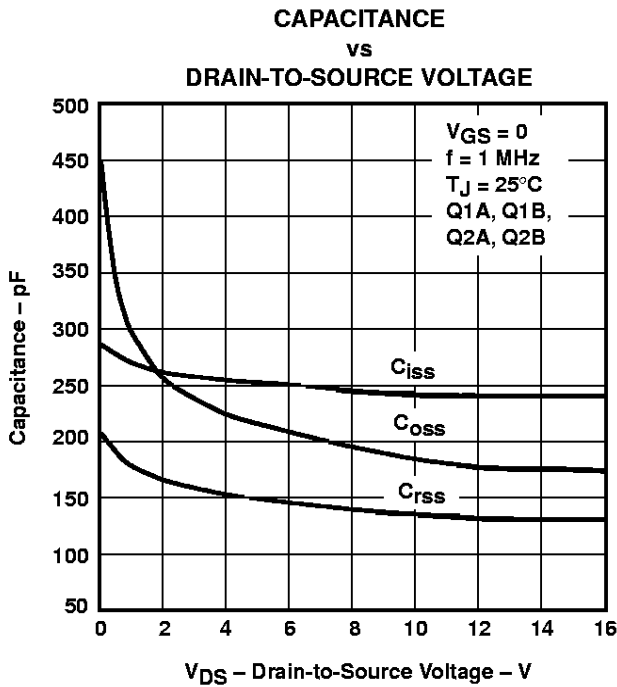


Figure 17

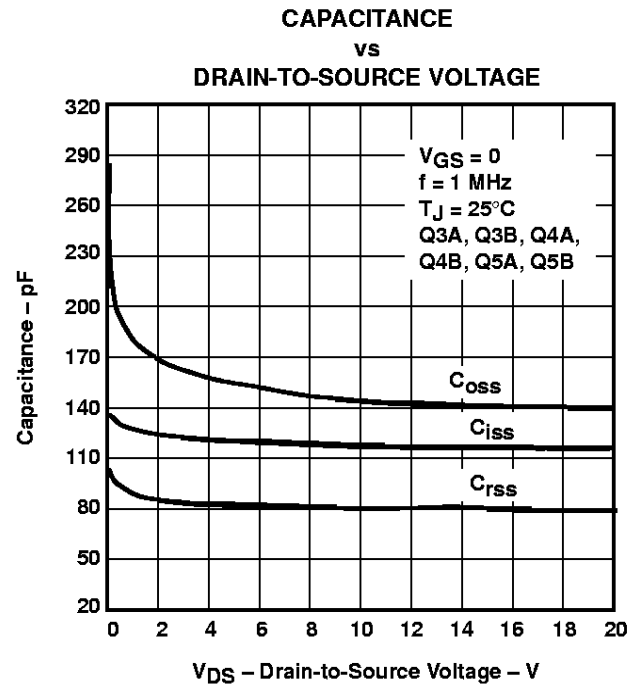


Figure 18



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TYPICAL CHARACTERISTICS

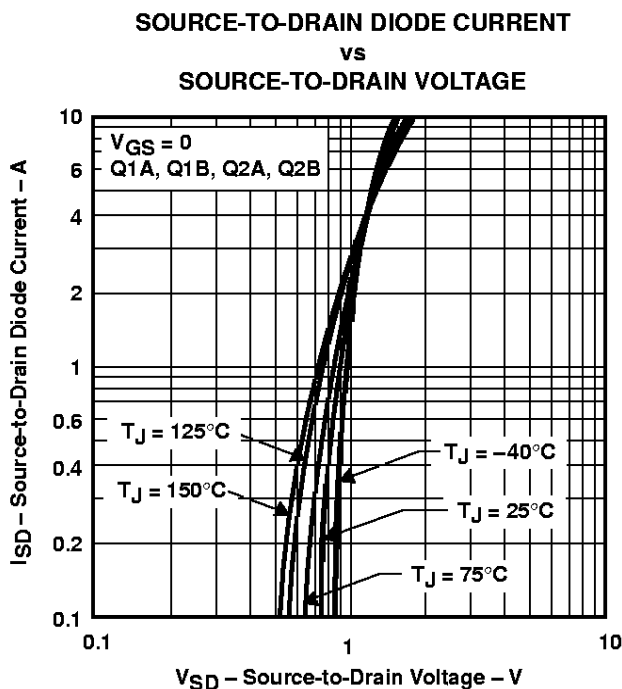


Figure 19

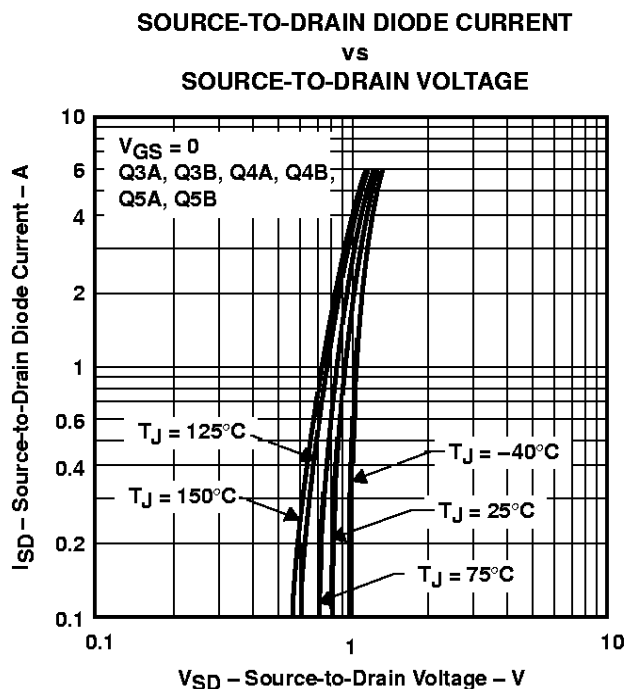


Figure 20

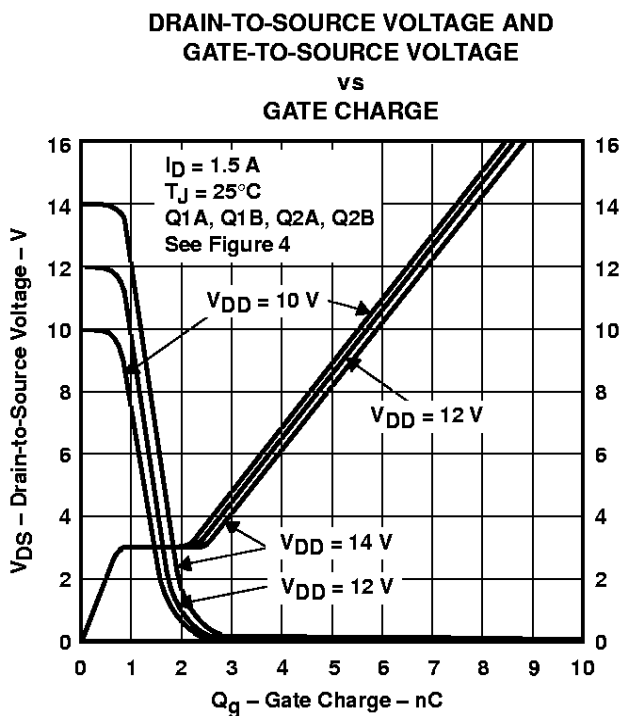


Figure 21

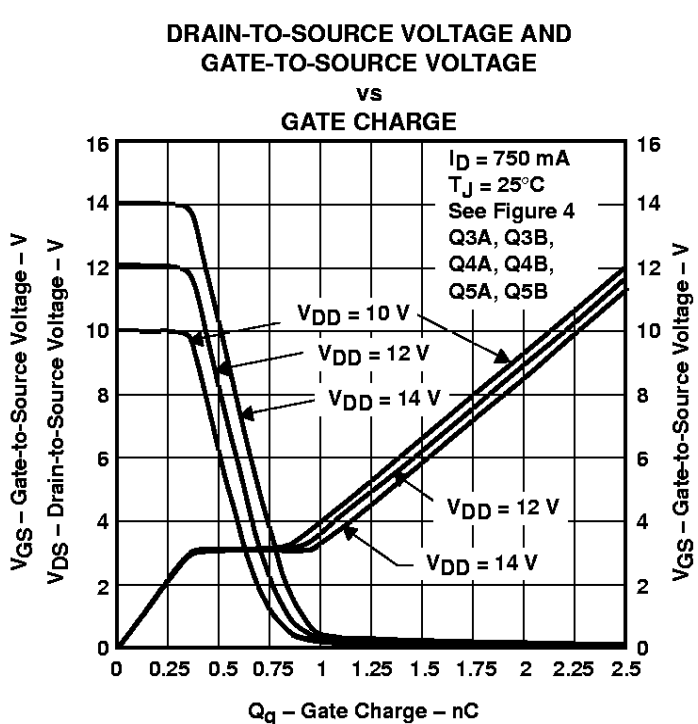


Figure 22

# TPIC1533 QUAD AND HEX POWER DMOS ARRAY

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## TYPICAL CHARACTERISTICS

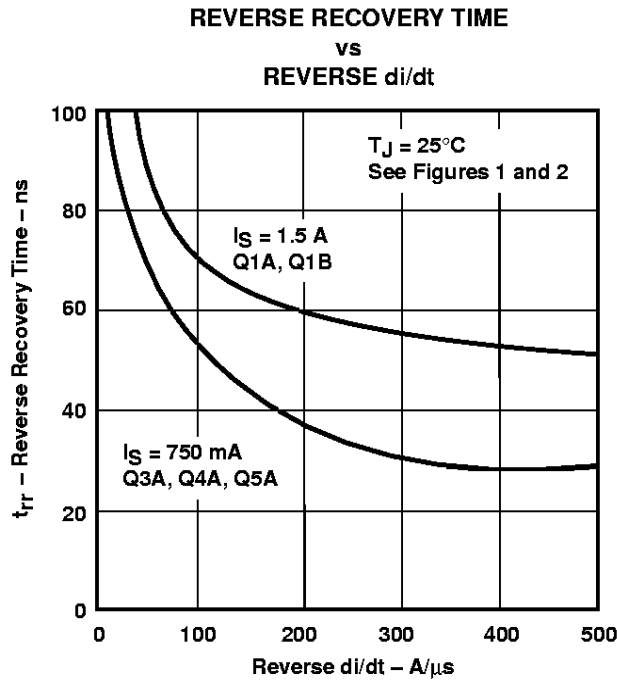


Figure 23

THERMAL INFORMATION

MAXIMUM DRAIN CURRENT  
 vs  
 DRAIN-TO-SOURCE VOLTAGE

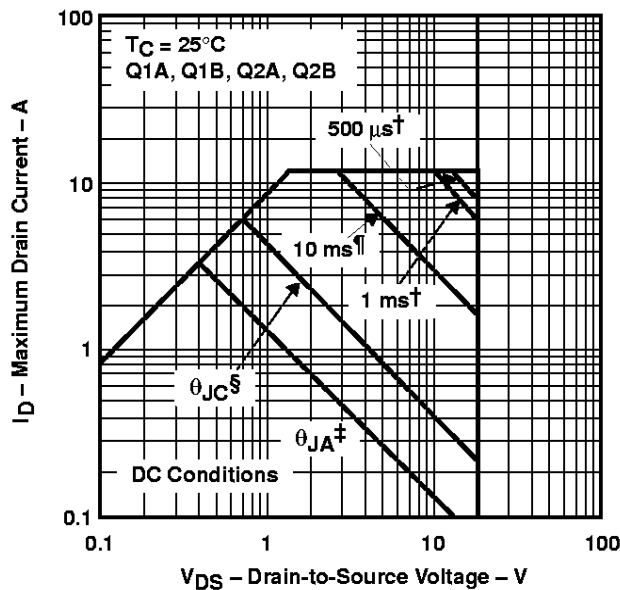


Figure 24

MAXIMUM DRAIN CURRENT  
 vs  
 DRAIN-TO-SOURCE VOLTAGE

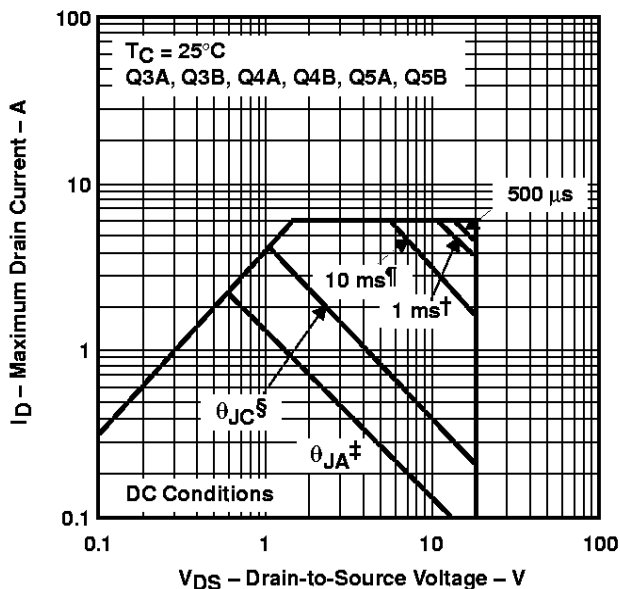


Figure 25

† Less than 10% duty cycle

‡ Device is mounted on FR4 printed-circuit board with no heat sink.

§ Device is mounted in intimate contact with infinite heat sink.

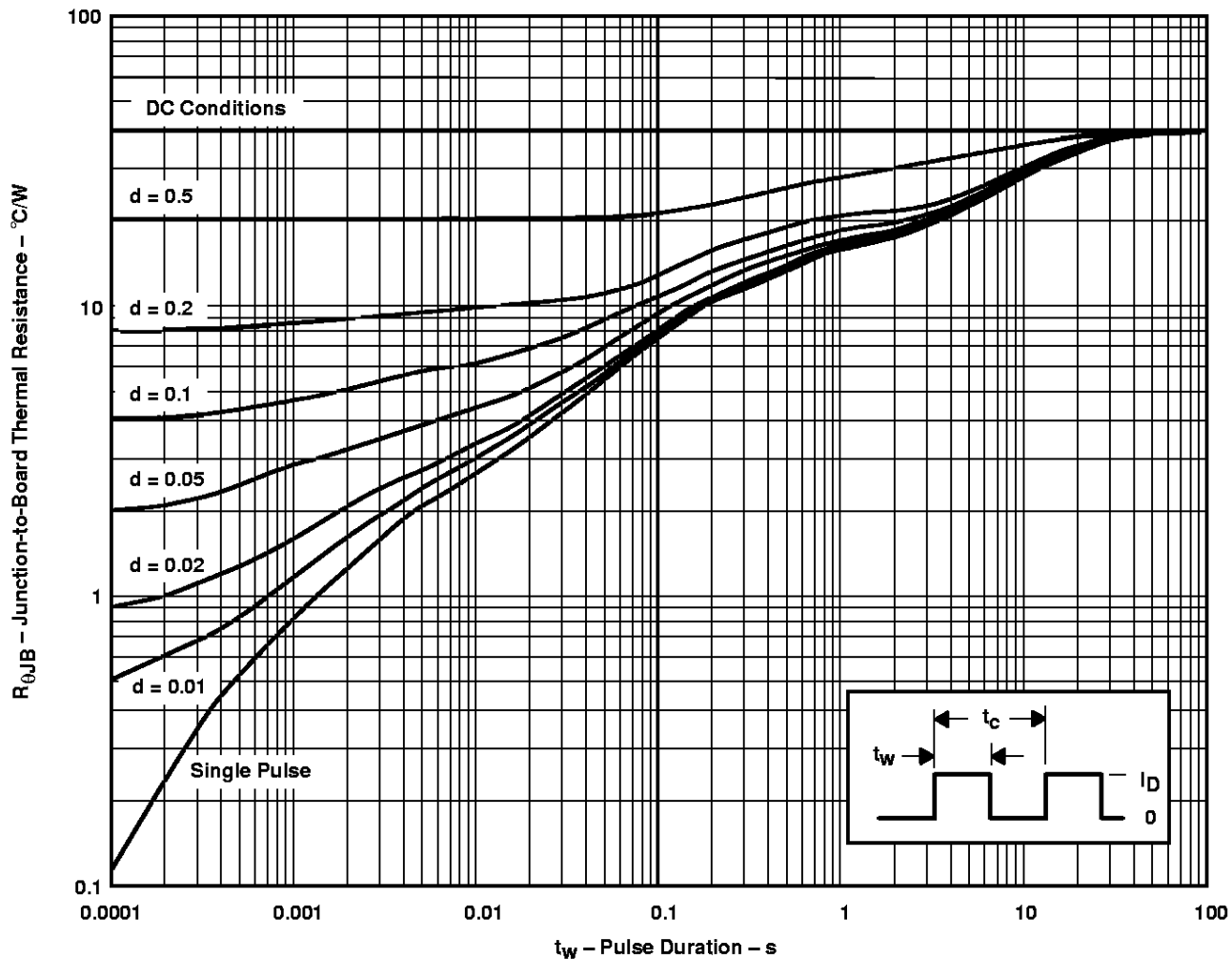
†† Less than 2% duty cycle

**TPIC1533**  
**QUAD AND HEX POWER DMOS ARRAY**

SLIS064 – OCTOBER 1996

**THERMAL INFORMATION**

**DW PACKAGE†**  
**JUNCTION-TO-BOARD THERMAL RESISTANCE**  
**vs**  
**PULSE DURATION**



† Device mounted on 24 in<sup>2</sup>, 4 layer FR4 printed-circuit board with no heat sink.

NOTE A:  $Z_{\theta B}(t) = r(t) R_{\theta JB}$   
 $t_w$  = pulse duration  
 $t_c$  = cycle time  
 $d$  = duty cycle =  $t_w/t_c$

**Figure 26**



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