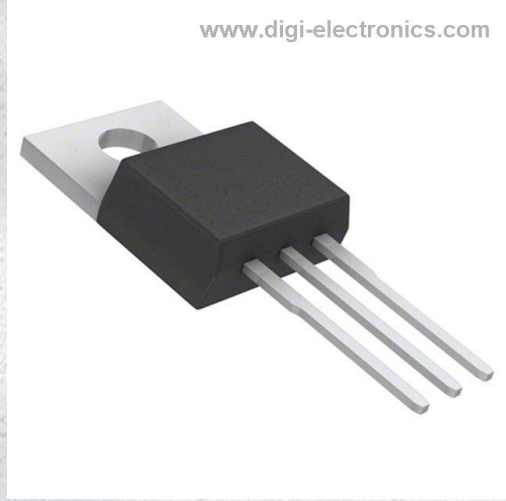
# RFP8P05 Datasheet




| | |
|---|---|
| DiGi Electronics Part Number | RFP8P05-DG |
| Manufacturer | onsemi |
| Manufacturer Product Number | RFP8P05 |
| Description | MOSFET P-CH 50V 8A TO220-3 |
| Detailed Description | P-Channel 50 V 8A (Tc) Through Hole TO-220-3 |

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## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| RFP8P05 | onsemi |
| Series: | Product Status: |
| - | Obsolete |
| FET Type: | Technology: |
| P-Channel | MOSFET (Metal Oxide) |
| Drain to Source Voltage (Vdss): | Current - Continuous Drain (Id) @ 25°C: |
| 50 V | 8A (Tc) |
| Rds On (Max) @ Id, Vgs: | Vgs(th) (Max) @ Id: |
| 300mOhm @ 8A, 10V | 4V @ 250µA |
| Gate Charge (Qg) (Max) @ Vgs: | FET Feature: |
| 80 nC @ 20 V | - |
| Mounting Type: | Supplier Device Package: |
| Through Hole | TO-220-3 |
| Package / Case: | Base Product Number: |
| TO-220-3 | RFP8P |

## Environmental & Export classification

| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| RoHS non-compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.29.0095 | |

FAIRCHILD SEMICONDUCTOR®

# RFD8P05, RFD8P05SM, RFP8P05

**Data Sheet** **January 2002**

## 8A, 50V, 0.300 Ohm, P-Channel Power MOSFETs

These products are P-Channel power MOSFETs manufactured using the MegaFET process. This process, which uses feature sizes approaching those of LSI circuits, gives optimum utilization of silicon, resulting in outstanding performance. They were designed for use in applications such as switching regulators, switching converters, motor drivers, and relay drivers. These transistors can be operated directly from integrated circuits.

Formerly developmental type TA09832.

## Ordering Information

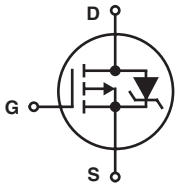
| PART NUMBER | PACKAGE | BRAND |
|---|---|---|
| RFD8P05 | TO-251AA | D8P05 |
| RFD8P05SM | TO-252AA | D8P05 |
| RFP8P05 | TO-220AB | RFP8P05 |

NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-252AA variant in tape and reel, i.e., RFD8P05SM9A.

## Features

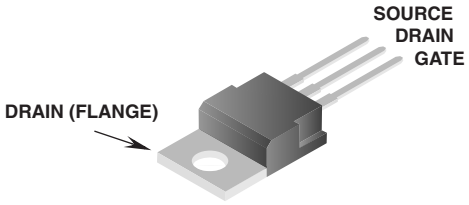
- 8A, 50V
- $r_{DS(ON)} = 0.300\Omega$
- UIS SOA Rating Curve
- SOA is Power Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Related Literature
  - TB334 “Guidelines for Soldering Surface Mount Components to PC Boards”

## Symbol

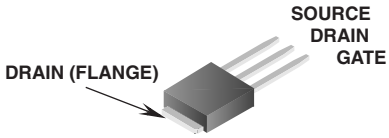



## Packaging

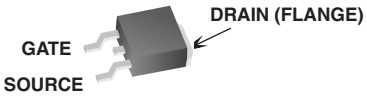
**JEDEC TO-220AB**




**JEDEC TO-251AA**




**JEDEC TO-252AA**



# *RFD8P05, RFD8P05SM, RFP8P05*

## Absolute Maximum Ratings $T_C = 25^oC$ Unless Otherwise Specified

| | | RFD8P05, RFD8P05SM, RFP8P05 | UNITS |
|---|---|---|---|
| Drain to Source Voltage (Note 1) | $V_{DSS}$ | -50 | V |
| Drain to Gate Voltage ($R_{GS}$ = 20KΩ) (Note 1) | $V_{DGR}$ | -50 | V |
| Continuous Drain Current | $I_D$ | -8 | A |
| Pulsed Drain Current (Note 3) | $I_{DM}$ | -20 | A |
| Gate to Source Voltage | $V_{GS}$ | ±20 | V |
| Maximum Power Dissipation | $P_D$ | 48 | W |
| Dissipation Derating Factor | | 0.27 | W/$^o$C |
| Single Pulse Avalanche Energy Rating | $E_{AS}$ | See Figure 6 | |
| Operating and Storage Temperature | $T_J$, $T_{STG}$ | -55 to 175 | $^o$C |
| Maximum Temperature for Soldering | | | |
| Leads at 0.063in (1.6mm) from Case for 10s | $T_L$ | 300 | $^o$C |
| Package Body for 10s, See Techbrief 334 | $T_{pkg}$ | 260 | $^o$C |

*CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.*

NOTE:

1. $T_J = 25^oC$ to $150^oC$.

## Electrical Specifications $T_C = 25^oC$ Unless Otherwise Specified

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|---|
| Drain to Source Breakdown Voltage | $BV_{DSS}$ | $I_D$ = 250μA, $V_{GS}$ = 0V (Figure 9) | | -50 | - | - | V |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = 250μA (Figure 8) | | -2 | - | -4 | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = Rated $BV_{DSS}$, $V_{GS}$ = 0V | | - | - | 1 | μA |
| | | $V_{DS}$ = 0.8 x Rated $BV_{DSS}$, $T_J = 150^oC$ | | - | - | 25 | μA |
| Gate to Source Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±20V | | - | - | ±100 | nA |
| Drain to Source On Resistance (Note 2) | $r_{DS(ON)}$ | $I_D$ = 8A, $V_{GS}$ = -10V (Figure 7) | | - | - | 0.300 | Ω |
| Turn-On Time | $t_{ON}$ | $V_{DD}$ = -25V, $I_D \approx$ 4A, $R_G$ = 9.1Ω, $R_L$ = 6.25Ω, $V_{GS}$ = -10V | | - | - | 60 | ns |
| Turn-On Delay Time | $t_{d(ON)}$ | | | - | 16 | - | ns |
| Rise Time | $t_r$ | | | - | 30 | - | ns |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | | - | 42 | - | ns |
| Fall Time | $t_f$ | | | - | 20 | - | ns |
| Turn-Off Time | $t_{OFF}$ | | | - | - | 100 | ns |
| Total Gate Charge | $Q_{g(TOT)}$ | $V_{GS}$ = 0 to -20V | $V_{DD}$ = -40V, $I_D$ = 8A, $R_L$ = 5Ω, $I_{G(REF)}$ = -0.3mA | - | - | 80 | nC |
| Gate Charge at -5V | $Q_{g(-10)}$ | $V_{GS}$ = 0 to -10V | | - | - | 40 | nC |
| Threshold Gate Charge | $Q_{g(TH)}$ | $V_{GS}$ = 0 to -2V | | - | - | 2 | nC |
| Thermal Resistance Junction to Case | $R_{\theta JC}$ | | | - | - | 3.125 | $^o$C/W |
| Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | TO-251AA, TO-252AA | | - | - | 100 | $^o$C/W |
| | | TO-220AB | | | | 62.5 | $^o$C/W |

## Source to Drain Diode Specifications $T_C = 25^oC$ Unless Otherwise Specified

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| Source to Drain Diode Voltage (Note 2) | $V_{SD}$ | $I_{SD}$ = -8A | - | - | -1.5 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_{SD}$ = -8A, $dI_{SD}/dt$ = 100A/μs | - | - | 125 | ns |

NOTE:

2. Pulse test: pulse width ≤ 300μs, Duty Cycle ≤ 2%.
3. Repetitive rating: pulse width is limited by maximum junction temperature.

## *Typical Performance Curves* Unless Otherwise Specified

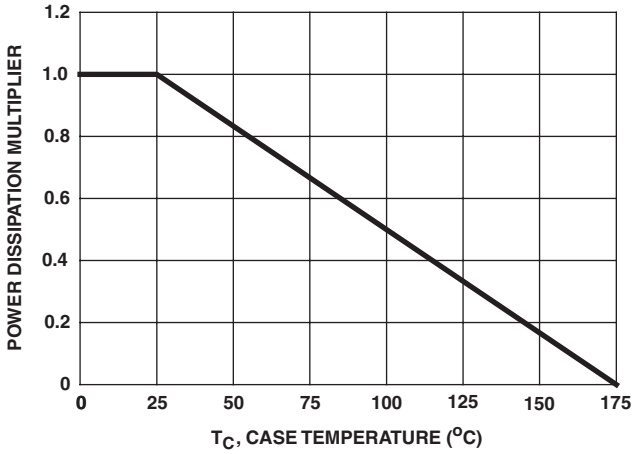



**FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE**

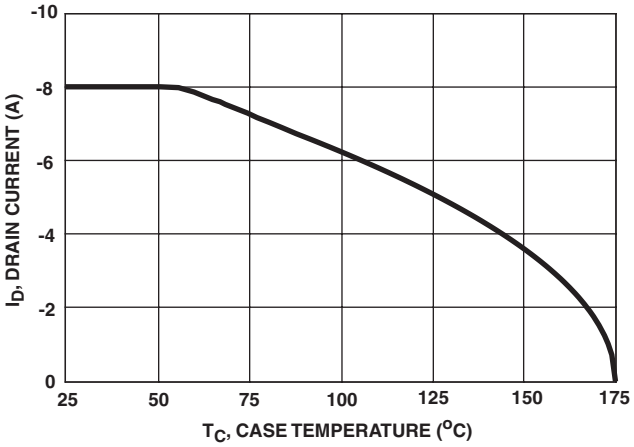



**FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE**

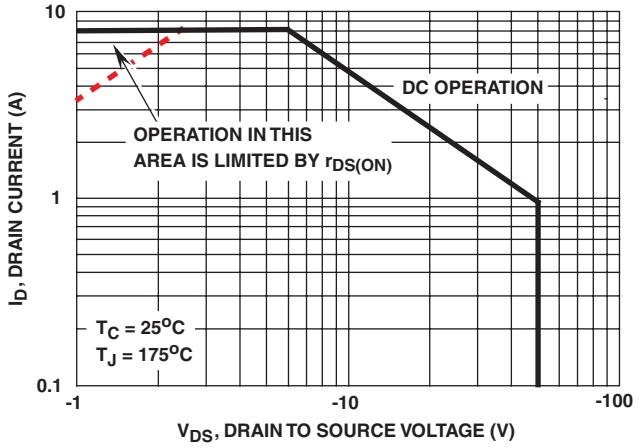



**FIGURE 3. FORWARD BIAS SAFE OPERATING AREA**

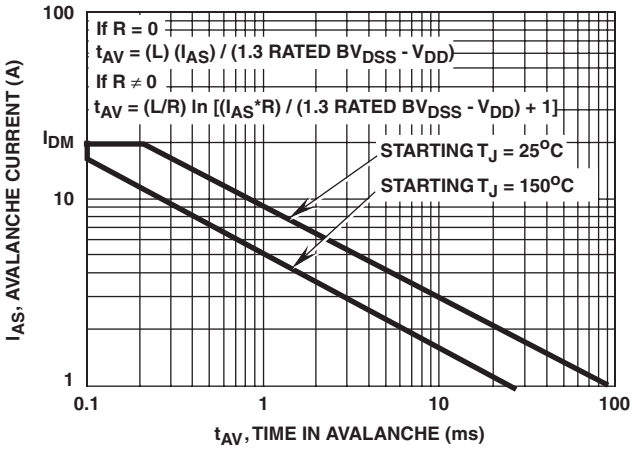



**FIGURE 4. UNCLAMPED INDUCTIVE SWITCHING CAPABILITY**

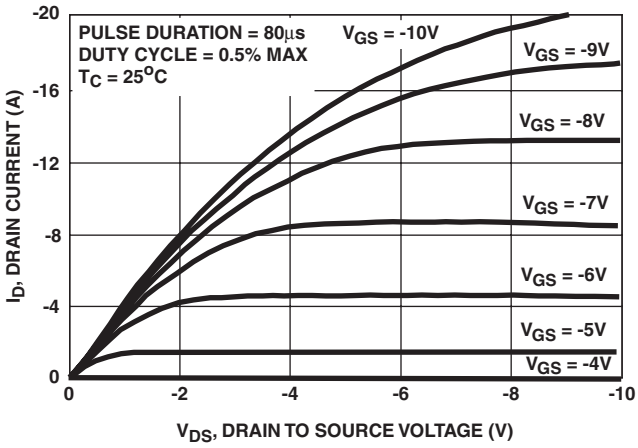



**FIGURE 5. SATURATION CHARACTERISTICS**

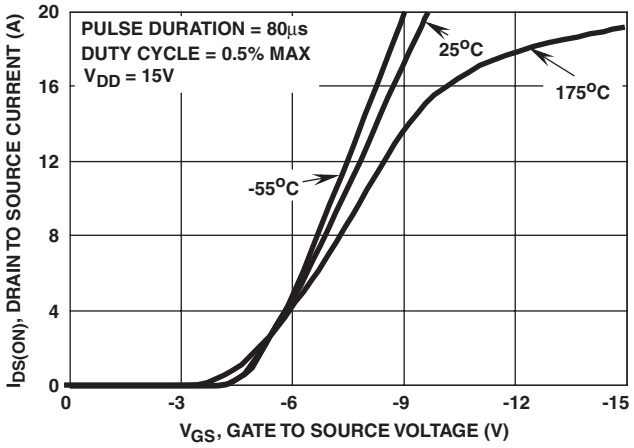



**FIGURE 6. TRANSFER CHARACTERISTICS**

## *Typical Performance Curves* Unless Otherwise Specified

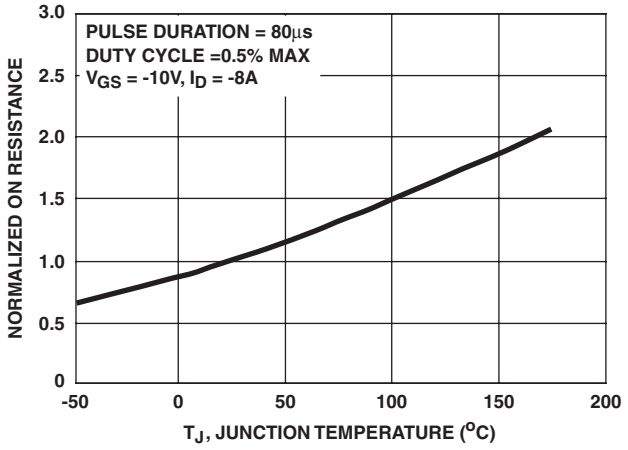



**FIGURE 7. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE**

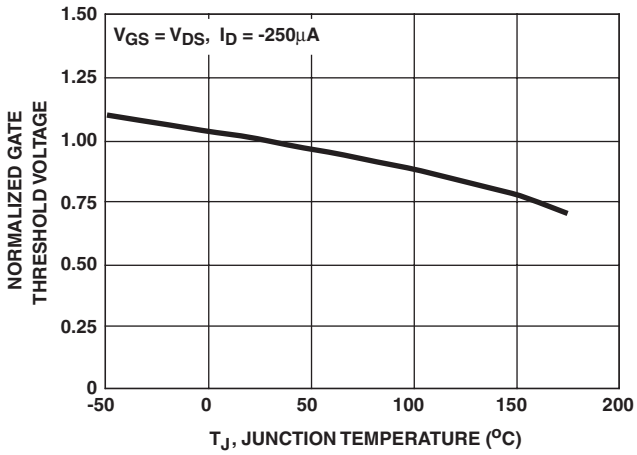



**FIGURE 8. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE**

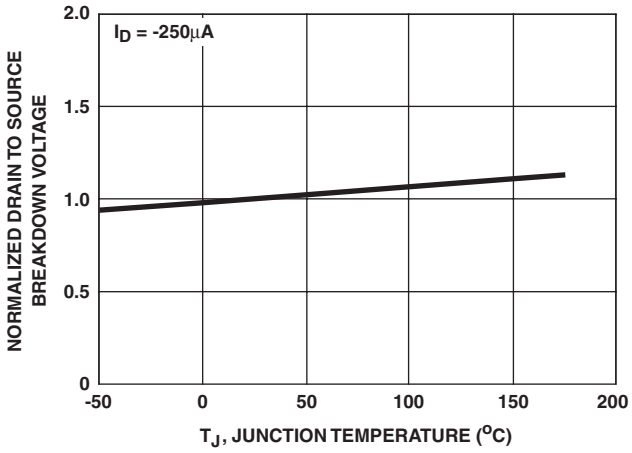



**FIGURE 9. NORMALIZED DRAIN TO SOURCE BREAKDOWN VOLTAGE vs JUNCTION TEMPERATURE**

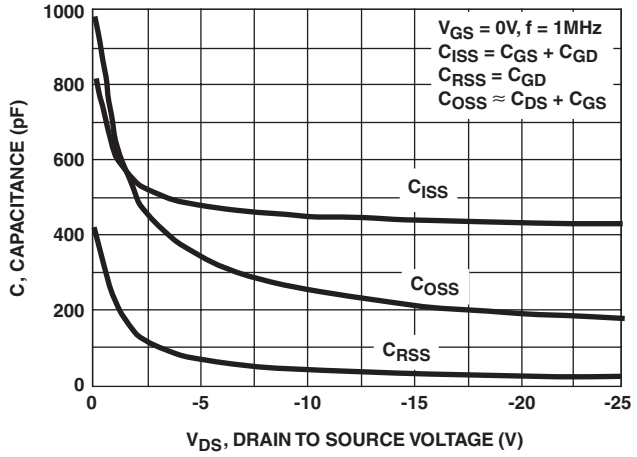
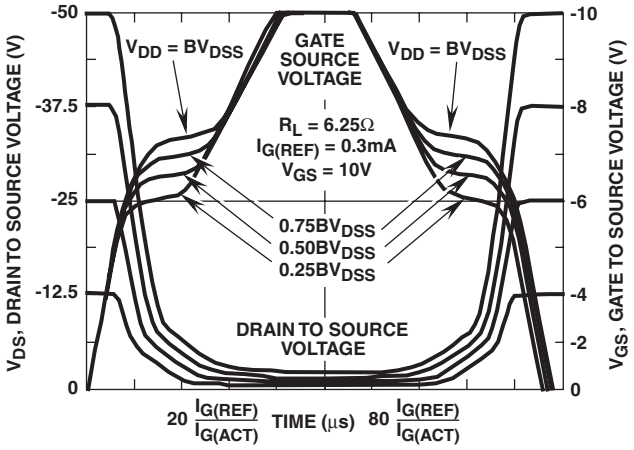



**FIGURE 10. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE**




NOTE: Refer to Application Notes AN7254 and AN7260.

**FIGURE 11. NORMALIZED SWITCHING WAVEFORMS FOR CONSTANT GATE CURRENT**

## *Test Circuits and Waveforms*

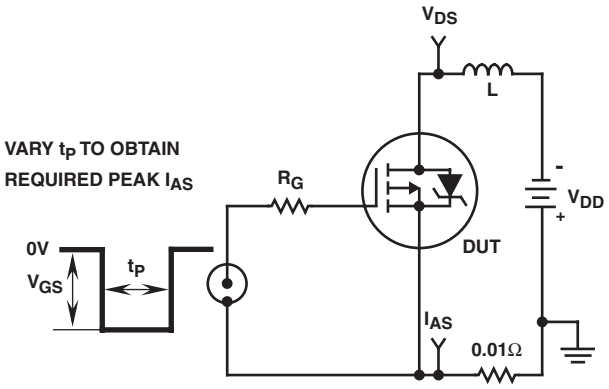



FIGURE 12. UNCLAMPED ENERGY TEST CIRCUIT

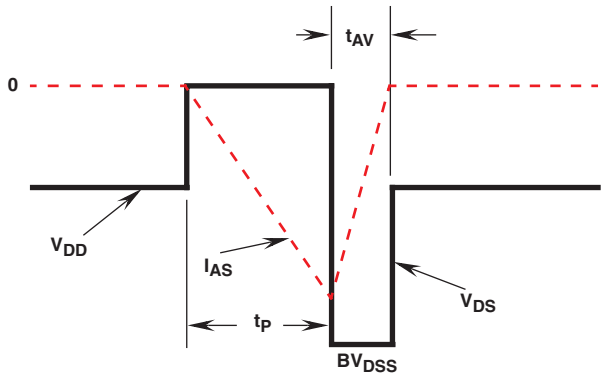



FIGURE 13. UNCLAMPED ENERGY WAVEFORMS

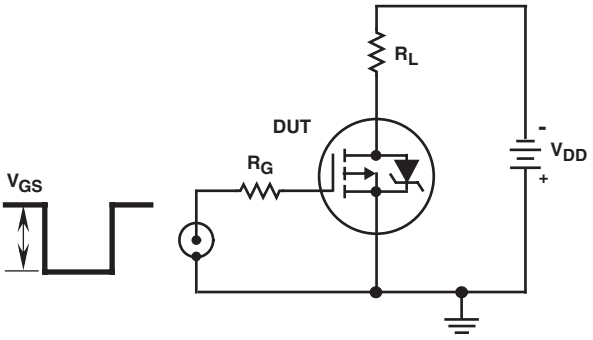



FIGURE 14. SWITCHING TIME TEST CIRCUIT

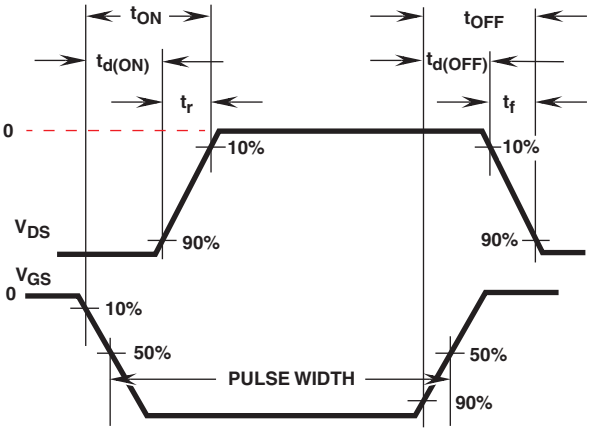



FIGURE 15. RESISTIVE SWITCHING WAVEFORMS

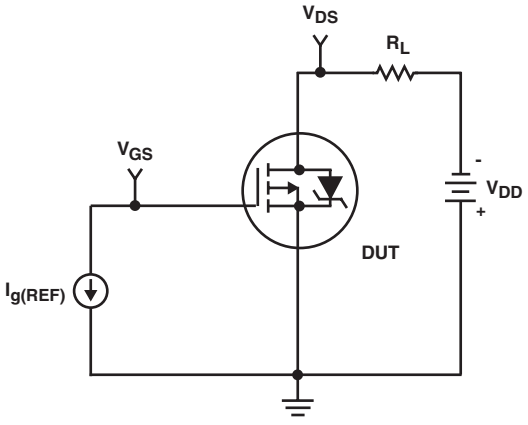



FIGURE 16. GATE CHARGE TEST CIRCUIT

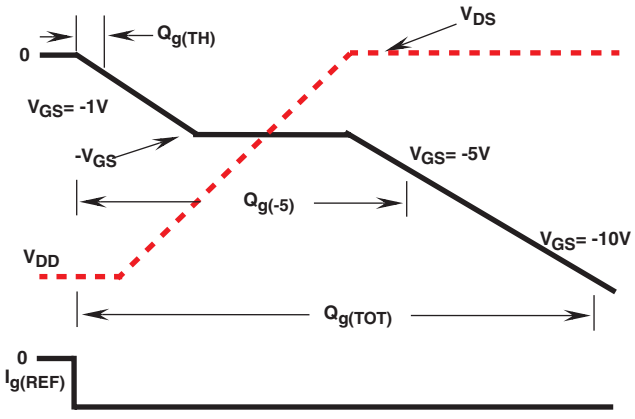



FIGURE 17. GATE CHARGE WAVEFORMS

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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|---|---|---|
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Rev. H4

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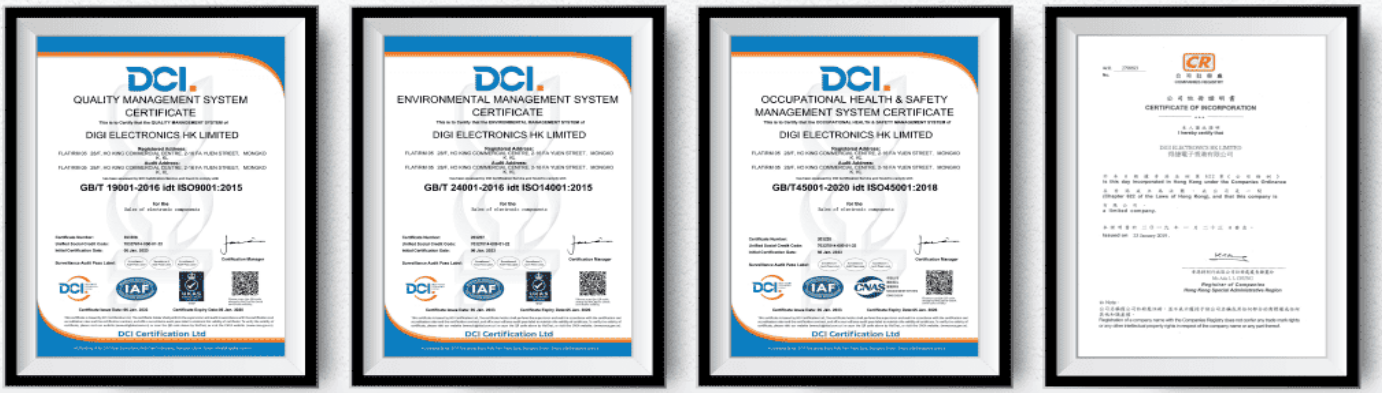



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