

CURRENT 24 Ampere
 VOLTAGE RANG 500 Volts

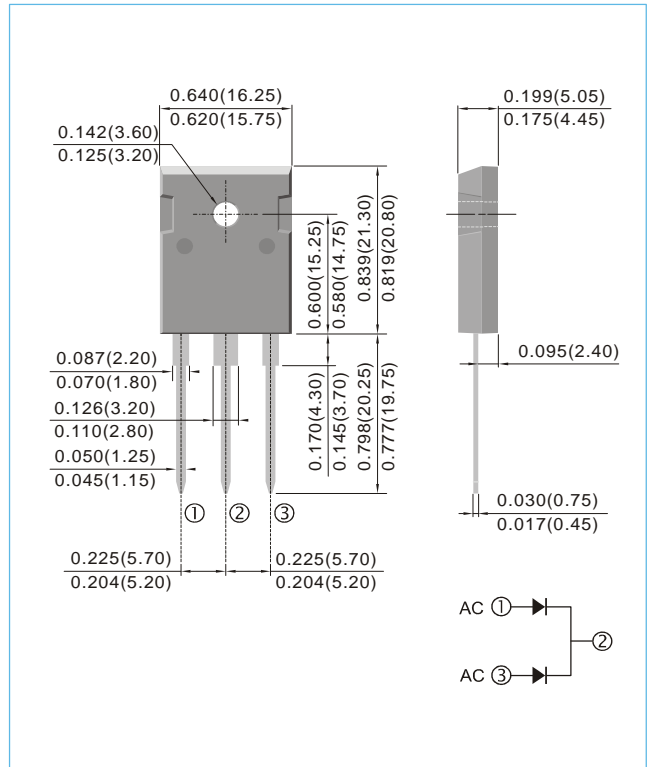
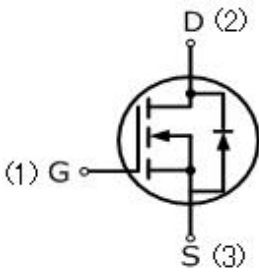
ASE24N50

TO-247AD / TO-3P Unit : inch(mm)

■ FEATURES

- * $R_{DS(ON)}=0.24\Omega @ V_{GS}=10V$
- * High Switching Speed
- * 100% Avalanche Tested

■ SYMBOL



■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|--------------|---------|----------------|---|---|---------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| 24N50L-T47-T | 24N50G-T47-T | TO-247 | G | D | S | Tube |

Note: Pin Assignment: G: Gate D: Drain S: Source

| | |
|--|--|
| <p>24N50L-T47-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>3 Lead Free</p> | <p>(1) T: Tube</p> <p>(2) T47: TO-247</p> <p>(3) G: Halogen Free, L: Lead Free</p> |
|--|--|

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■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|------------------------------------|---------------------------------------|-----------|-------------|---------------------|
| Drain-Source Voltage | | V_{DSS} | 500 | V |
| Gate-Source Voltage | | V_{GSS} | ± 30 | V |
| Drain Current | Continuous ($T_C=25^\circ\text{C}$) | I_D | 24 (Note 2) | A |
| | Pulsed (Note 3) | I_{DM} | 96 (Note 2) | A |
| Avalanche Current (Note 3) | | I_{AR} | 24 | A |
| Avalanche Energy | Single Pulsed (Note 4) | E_{AS} | 1100 | mJ |
| | Repetitive (Note 5) | E_{AR} | 29 | mJ |
| Peak Diode Recovery dv/dt (Note 5) | | dv/dt | 15 | V/ns |
| Power Dissipation | | P_D | 290 | W |
| Derate above 25°C | | | 2.33 | W/ $^\circ\text{C}$ |
| Junction Temperature | | T_J | +150 | $^\circ\text{C}$ |
| Storage Temperature | | T_{STG} | -55~+150 | $^\circ\text{C}$ |

Note: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Drain current limited by maximum junction temperature
3. Repetitive Rating: Pulse width limited by maximum junction temperature
4. $L = 3.4\text{mH}$, $I_{AS} = 24\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
5. $I_{SD} \leq 24\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------|---------------|---------|---------------------------|
| Junction to Ambient | θ_{JA} | 40 | $^\circ\text{C}/\text{W}$ |
| Junction to Case | θ_{JC} | 0.43 | $^\circ\text{C}/\text{W}$ |

■ ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|--------------|--|-----|------|---------|---------------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$ | 500 | | | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=500\text{V}$, $V_{GS}=0\text{V}$ | | | 50 | μA |
| Gate- Source Leakage Current | Forward | I_{GSS} | | | +100 | nA |
| | | | | | Reverse | -100 |
| ON CHARACTERISTICS | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$ | 2.0 | | 4.0 | V |
| Static Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10\text{V}$, $I_D=12\text{A}$ | | 0.15 | 0.24 | Ω |
| DYNAMIC PARAMETERS | | | | | | |
| Input Capacitance | C_{ISS} | $V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$ | | 3500 | 4500 | pF |
| Output Capacitance | C_{OSS} | | | 520 | 670 | pF |
| Reverse Transfer Capacitance | C_{RSS} | | | 55 | 70 | pF |

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■ ELECTRICAL CHARACTERISTICS(Cont.)

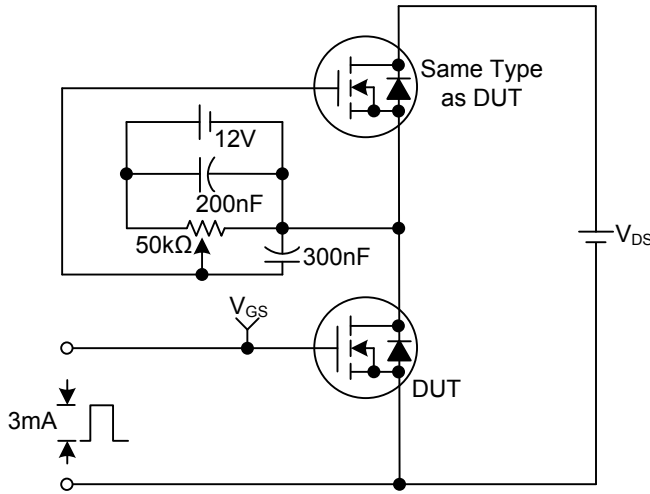
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|--------------|---|-----|-----|-----|---------|
| SWITCHING PARAMETERS | | | | | | |
| Total Gate Charge | Q_G | $V_{GS}=10V, V_{DS}=400V, I_D=24A$ (Note 1, 2) | | 90 | 120 | nC |
| Gate to Source Charge | Q_{GS} | | | 23 | | nC |
| Gate to Drain Charge | Q_{GD} | | | 52 | | nC |
| Turn-ON Delay Time | $t_{D(ON)}$ | $V_{DD}=250V, I_D=24A, R_G=25\Omega$ (Note 1, 2) | | 80 | 170 | ns |
| Rise Time | t_R | | | 250 | 500 | ns |
| Turn-OFF Delay Time | $t_{D(OFF)}$ | | | 200 | 400 | ns |
| Fall-Time | t_F | | | 155 | 320 | ns |
| SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS | | | | | | |
| Maximum Body-Diode Continuous Current | I_S | | | | 24 | A |
| Maximum Body-Diode Pulsed Current | I_{SM} | | | | 96 | A |
| Drain-Source Diode Forward Voltage | V_{SD} | $I_S=24A, V_{GS}=0V$ | | | 1.4 | V |
| Body Diode Reverse Recovery Time | t_{rr} | $I_S=24A, V_{GS}=0V,$ | | 250 | | ns |
| Body Diode Reverse Recovery Charge | Q_{RR} | $dI_F/dt=100A/\mu s$ (Note 1) | | 1.1 | | μC |

Note: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
 2. Essentially independent of operating temperature

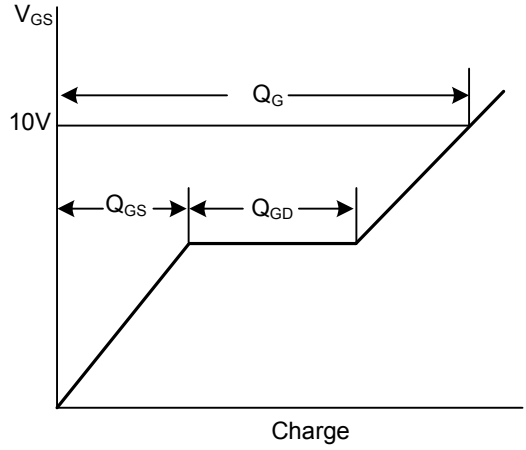
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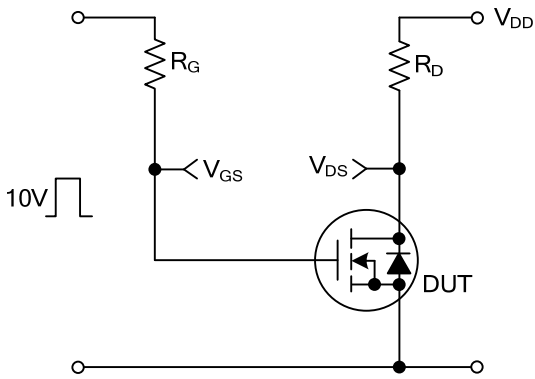
Gate Charge Test Circuit



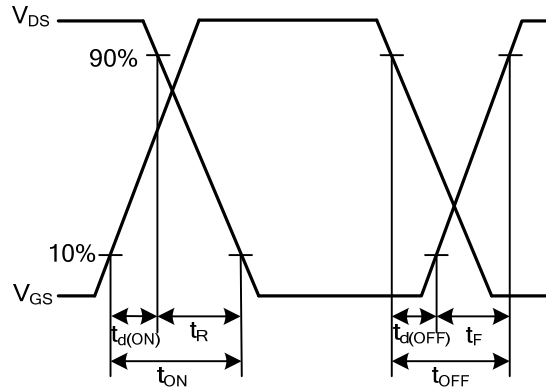
Gate Charge Waveforms



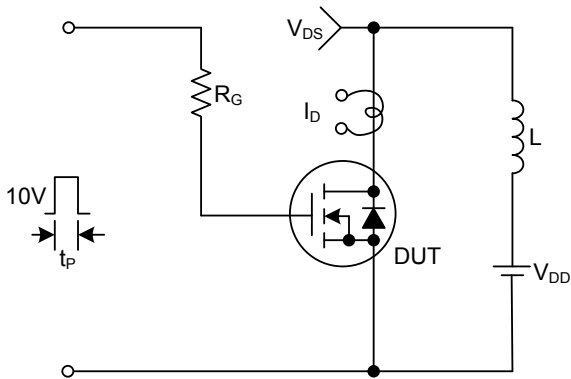
Resistive Switching Test Circuit



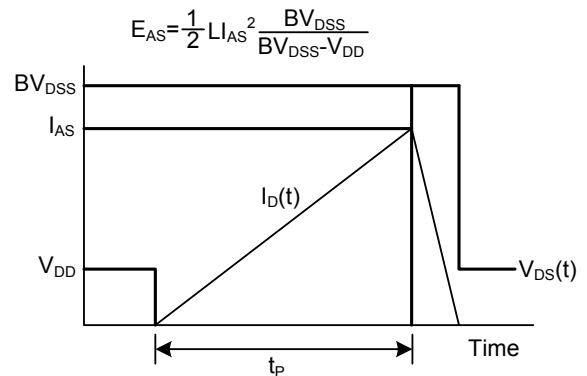
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



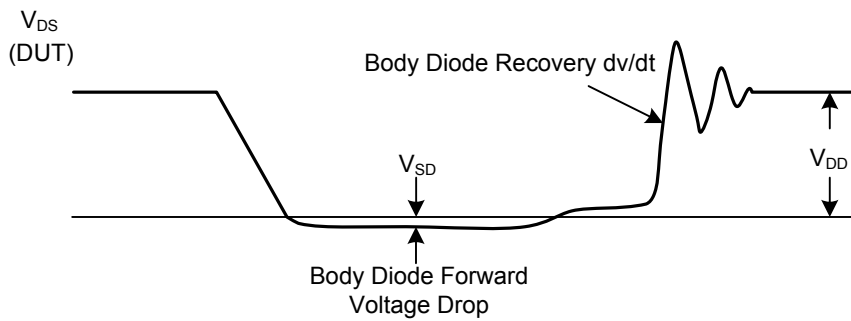
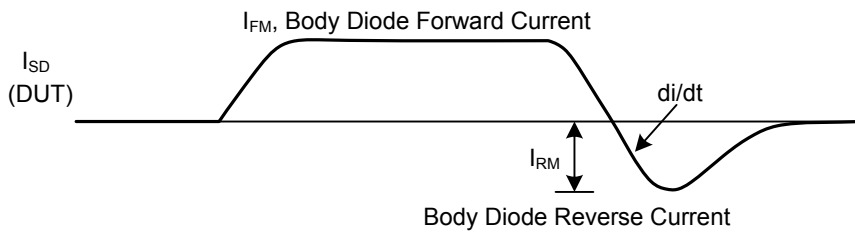
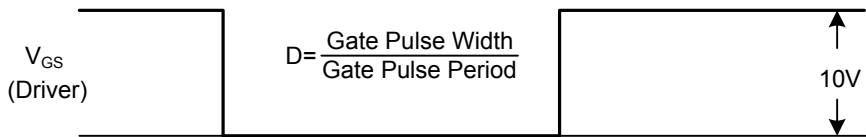
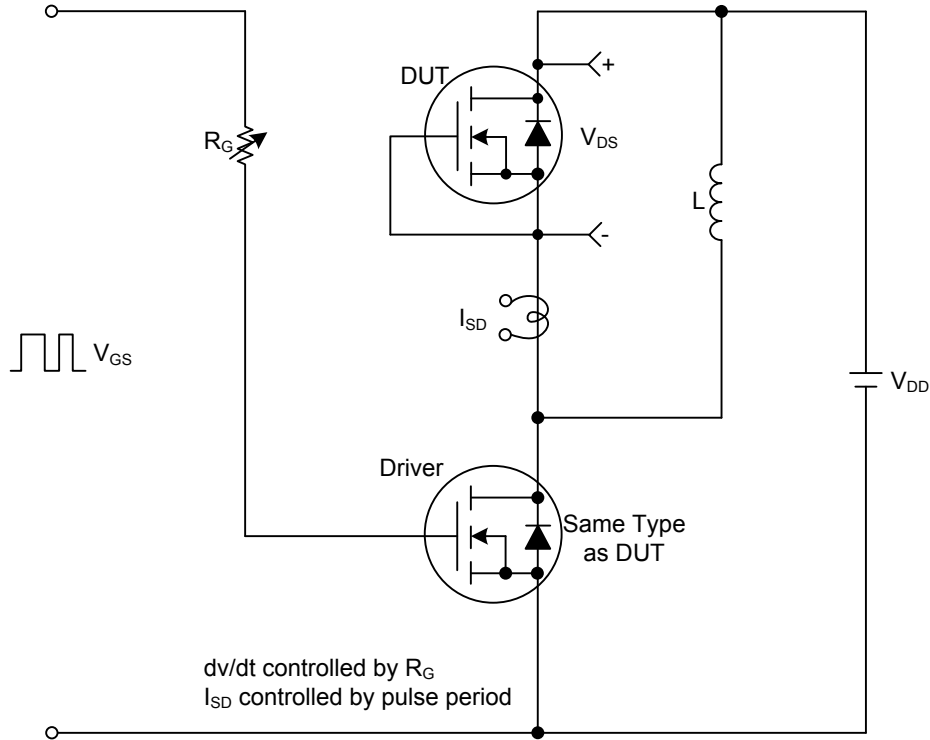
Unclamped Inductive Switching Waveforms



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Peak Diode Recovery dv/dt Test Circuit & Waveforms



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