# 6AM15

Silicon N/P Channel MOS FET
High Speed Power Switching

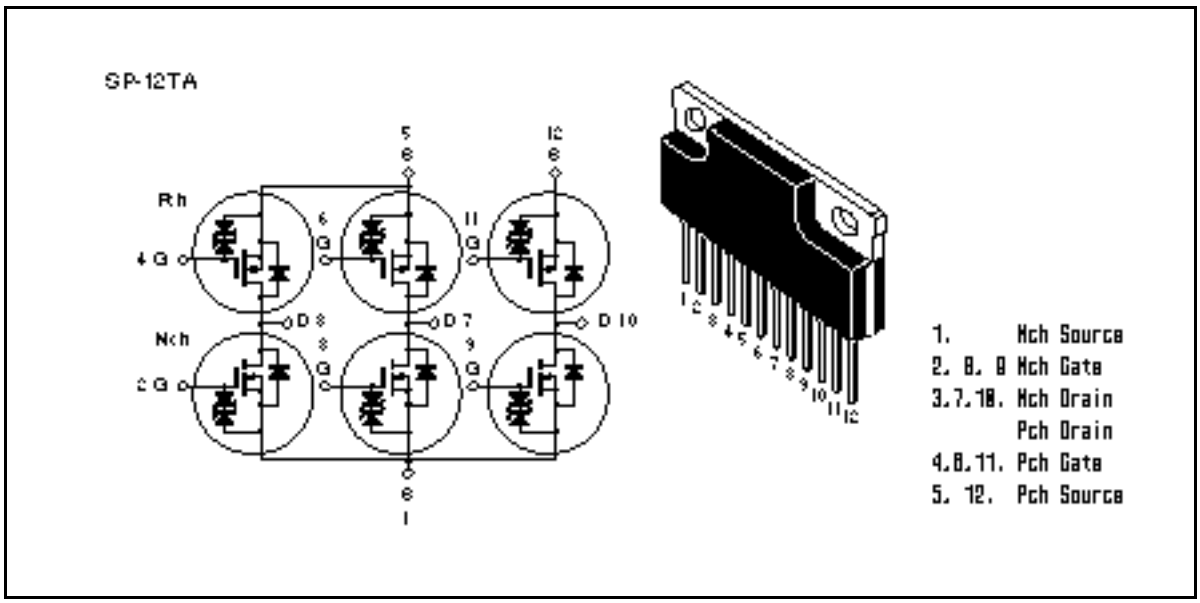
HITACHI

ADE-208-719 (Z)
1st. Edition
February 1999

## Features

- Low on-resistance
  N Channel : $R_{DS(on)}$ = 0.045 Ω typ.
  P Channel : $R_{DS(on)}$ = 0.085 Ω typ.
- High speed switching
- 4 V gate drive device can be driven from 5 V source
- High density mounting

## Outline



## Absolute Maximum Ratings (Ta = 25°C)

| Item | Symbol | Ratings | | Unit |
|---|---|---|---|---|
| | | Nch | Pch | |
| Drain to source voltage | $V_{DSS}$ | 60 | –60 | V |
| Gate to source voltage | $V_{GSS}$ | ±20 | ±20 | V |
| Drain current | $I_D$ | 10 | –10 | A |
| Drain peak current | $I_{D(pulse)}$ Note1 | 40 | –40 | A |
| Body-drain diode reverse drain current | $I_{DR}$ | 10 | –10 | A |
| Avalanche current | $I_{AP}$ Note3 | 10 | –10 | A |
| Avalanche energy | $E_{AR}$ Note3 | 8.5 | | mJ |
| Channel dissipation | Pch (Tc = 25°C) Note2 | 42 | | W |
| Channel dissipation | Pch Note2 | 4.8 | | W |
| Channel temperature | Tch | 150 | | °C |
| Storage temperature | Tstg | –55 to +150 | | °C |

Note: 1. PW ≤ 10 µs, duty cycle ≤ 1%
2. 6 Devices operation
3. Value at Ta = 25°C, Rg ≥ 50 Ω

## Electrical Characteristics (N Channel) (Ta = 25°C)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 60 | — | — | V | $I_D$ = 10 mA, $V_{GS}$ = 0 |
| Gate to source breakdown voltage | $V_{(BR)GSS}$ | ±20 | — | — | V | $I_G$ = ±100 µA, $V_{DS}$ = 0 |
| Gate to source leak current | $I_{GSS}$ | — | — | ±10 | µA | $V_{GS}$ = ±16 V, $V_{DS}$ = 0 |
| Zero gate voltage drain current | $I_{DSS}$ | — | — | 10 | µA | $V_{DS}$ = 60 V, $V_{GS}$ = 0 |
| Gate to source cutoff voltage | $V_{GS(off)}$ | 1.5 | — | 2.5 | V | $V_{DS}$ = 10 V, $I_D$ = 1 mA |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 0.045 | 0.060 | Ω | $I_D$ = 5 A, $V_{GS}$ = 10 V Note5 |
| | $R_{DS(on)}$ | — | 0.070 | 0.115 | Ω | $I_D$ = 5 A, $V_{GS}$ = 4 V Note5 |
| Forward transfer admittance | $\|y_{fs}\|$ | 5.5 | 9 | — | S | $I_D$ = 5 A, $V_{DS}$ = 10 V Note5 |
| Input capacitance | Ciss | — | 500 | — | pF | $V_{DS}$ = 10 V |
| Output capacitance | Coss | — | 260 | — | pF | $V_{GS}$ = 0 |
| Reverse transfer capacitance | Crss | — | 110 | — | pF | f = 1 MHz |
| Turn-on delay time | $t_{d(on)}$ | — | 10 | — | ns | $V_{GS}$ =10 V, $I_D$ = 5 A |
| Rise time | $t_r$ | — | 50 | — | ns | $R_L$ = 6 Ω |
| Turn-off delay time | $t_{d(off)}$ | — | 90 | — | ns | |
| Fall time | $t_f$ | — | 100 | — | ns | |
| Body–drain diode forward voltage | $V_{DF}$ | — | 0.9 | — | V | $I_F$ =10 A, $V_{GS}$ = 0 |
| Body–drain diode reverse recovery time | $t_{rr}$ | — | 52 | — | ns | $I_F$ =10 A, $V_{GS}$ = 0<br>diF/ dt = 50A/ µs |

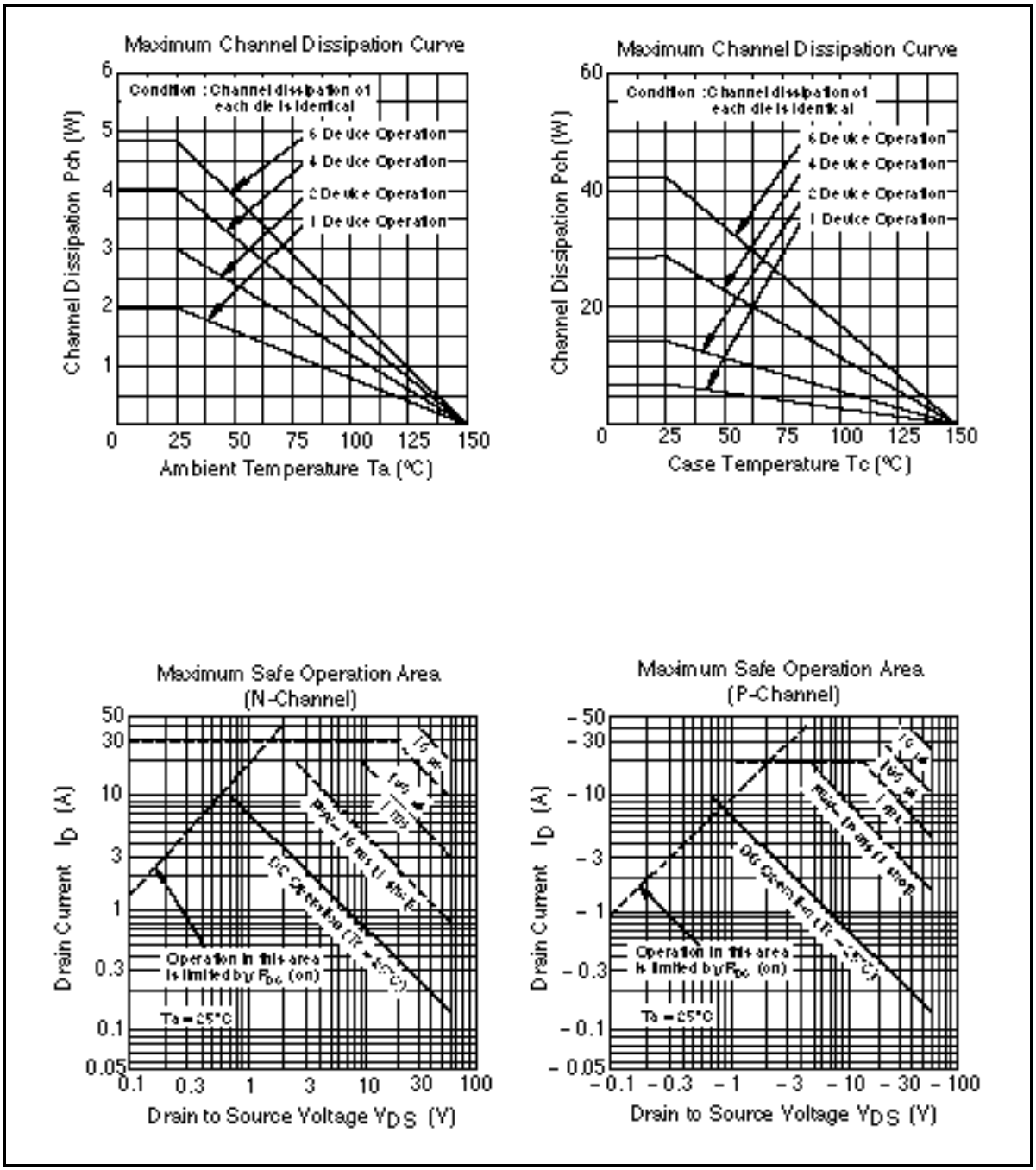
Note: 5. Pulse test

## Electrical Characteristics (P Channel) (Ta = 25°C)

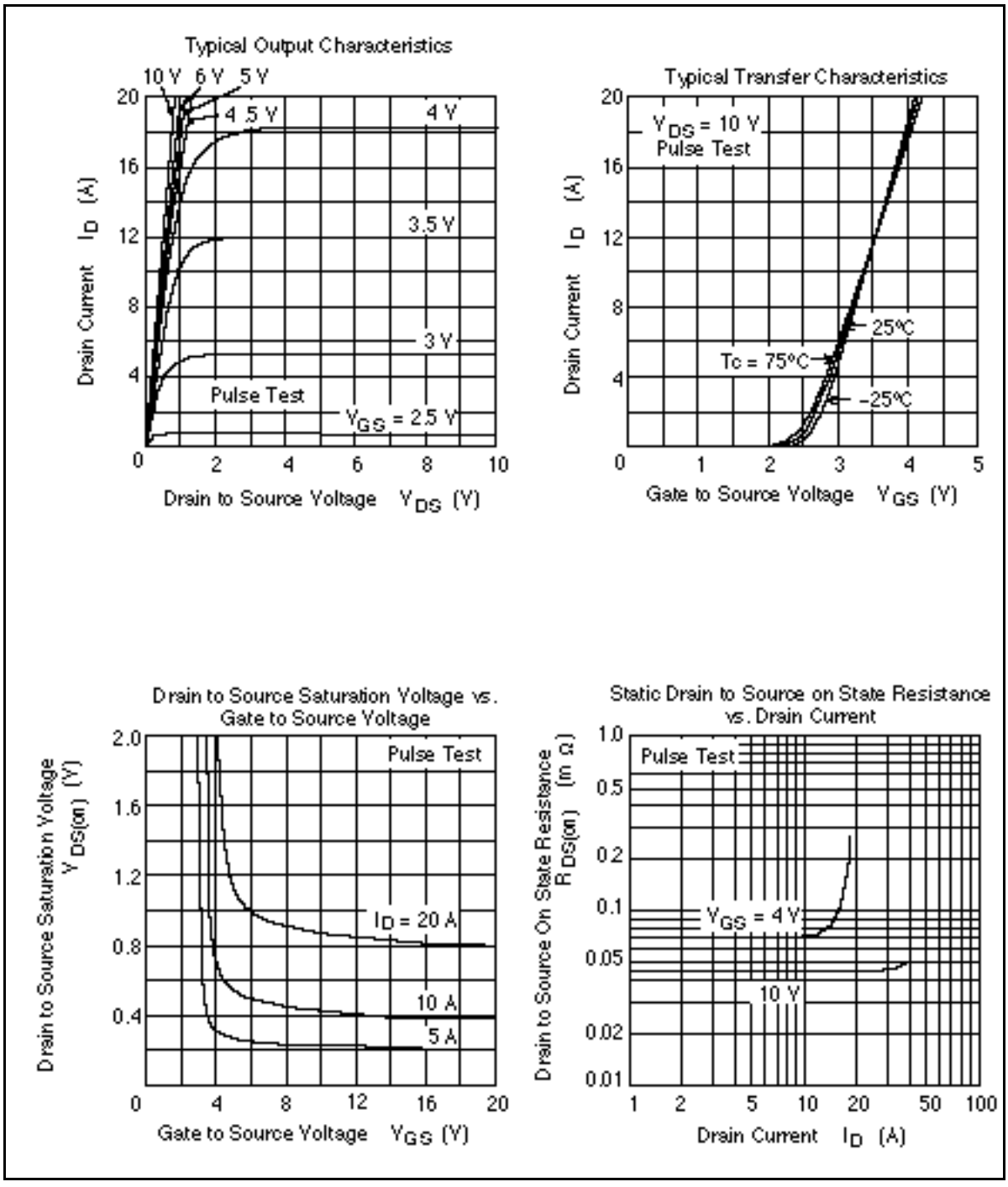
| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | –60 | — | — | V | $I_D$ = –10 mA, $V_{GS}$ = 0 |
| Gate to source breakdown voltage | $V_{(BR)GSS}$ | ±20 | — | — | V | $I_G$ = ±100 µA, $V_{DS}$ = 0 |
| Gate to source leak current | $I_{GSS}$ | — | — | ±10 | µA | $V_{GS}$ = ±16 V, $V_{DS}$ = 0 |
| Zero gate voltage drain current | $I_{DSS}$ | — | — | –10 | µA | $V_{DS}$ = –60 V, $V_{GS}$ = 0 |
| Gate to source cutoff voltage | $V_{GS(off)}$ | –1.0 | — | –2.0 | V | $V_{DS}$ = –10 V, $I_D$ = –1 mA |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 0.085 | 0.105 | Ω | $I_D$ = –5 A, $V_{GS}$ = –10 V Note5 |
| | $R_{DS(on)}$ | — | 0.115 | 0.165 | Ω | $I_D$ = –5 A, $V_{GS}$ = –4 V Note5 |
| Forward transfer admittance | $\|y_{fs}\|$ | 5.5 | 9 | — | S | $I_D$ = –5 A, $V_{DS}$ = –10 V Note5 |
| Input capacitance | Ciss | — | 850 | — | pF | $V_{DS}$ = –10 V |
| Output capacitance | Coss | — | 420 | — | pF | $V_{GS}$ = 0 |
| Reverse transfer capacitance | Crss | — | 110 | — | pF | f = 1 MHz |
| Turn-on delay time | $t_{d(on)}$ | — | 12 | — | ns | $V_{GS}$ = –10 V, $I_D$ = –5 A |
| Rise time | $t_r$ | — | 55 | — | ns | $R_L$ = 6 Ω |
| Turn-off delay time | $t_{d(off)}$ | — | 130 | — | ns | |
| Fall time | $t_f$ | — | 70 | — | ns | |
| Body–drain diode forward voltage | $V_{DF}$ | — | –0.95 | — | V | $I_F$ = –10 A, $V_{GS}$ = 0 |
| Body–drain diode reverse recovery time | $t_{rr}$ | — | 65 | — | ns | $I_F$ = –10 A, $V_{GS}$ = 0<br>diF/ dt = 50 A/ µs |

Note: 5. Pulse test

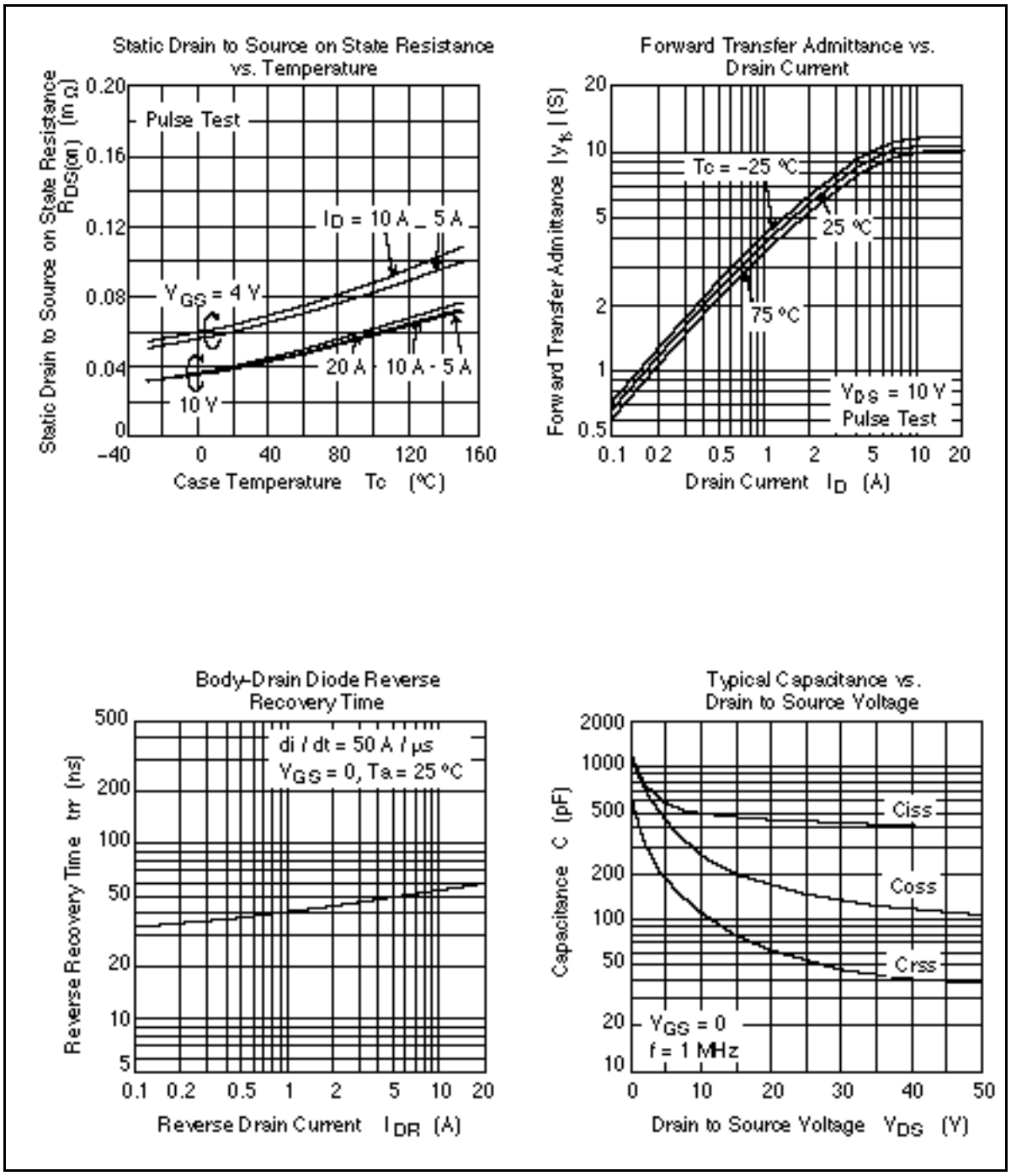
## Main Characteristics



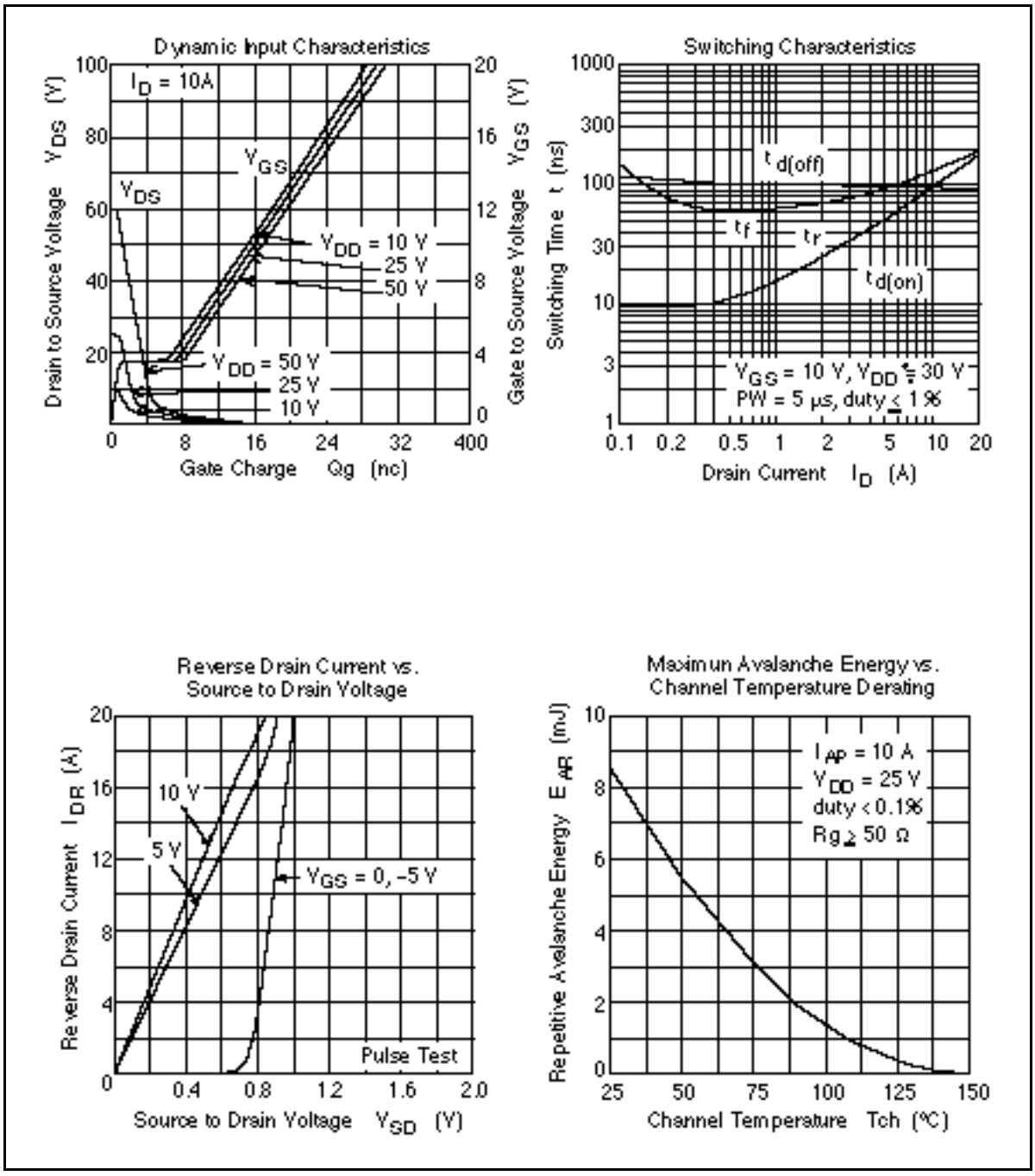
## Main Characteristics ( N Channel )



## Main Characteristics ( N Channel )

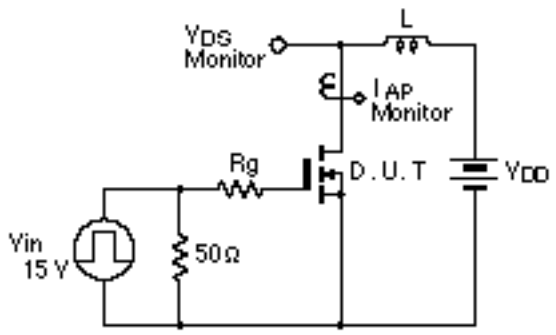


## Main Characteristics ( N Channel )



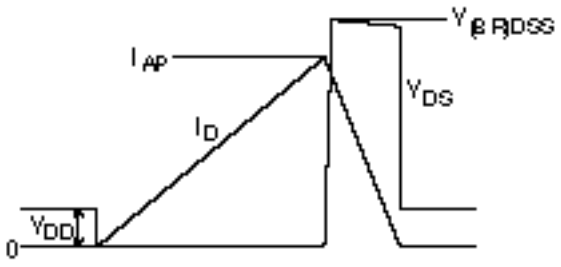
## Main Characteristics ( N Channel )

Avalanche Test Circuit

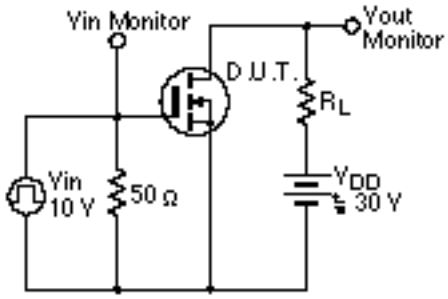



Avalanche Waveform

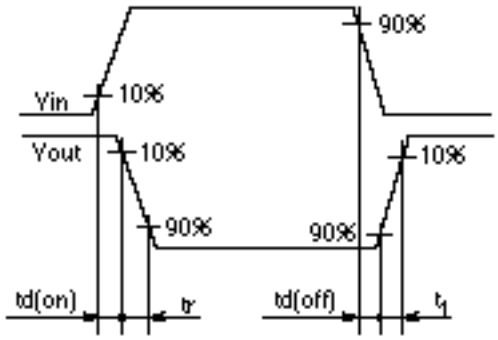
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



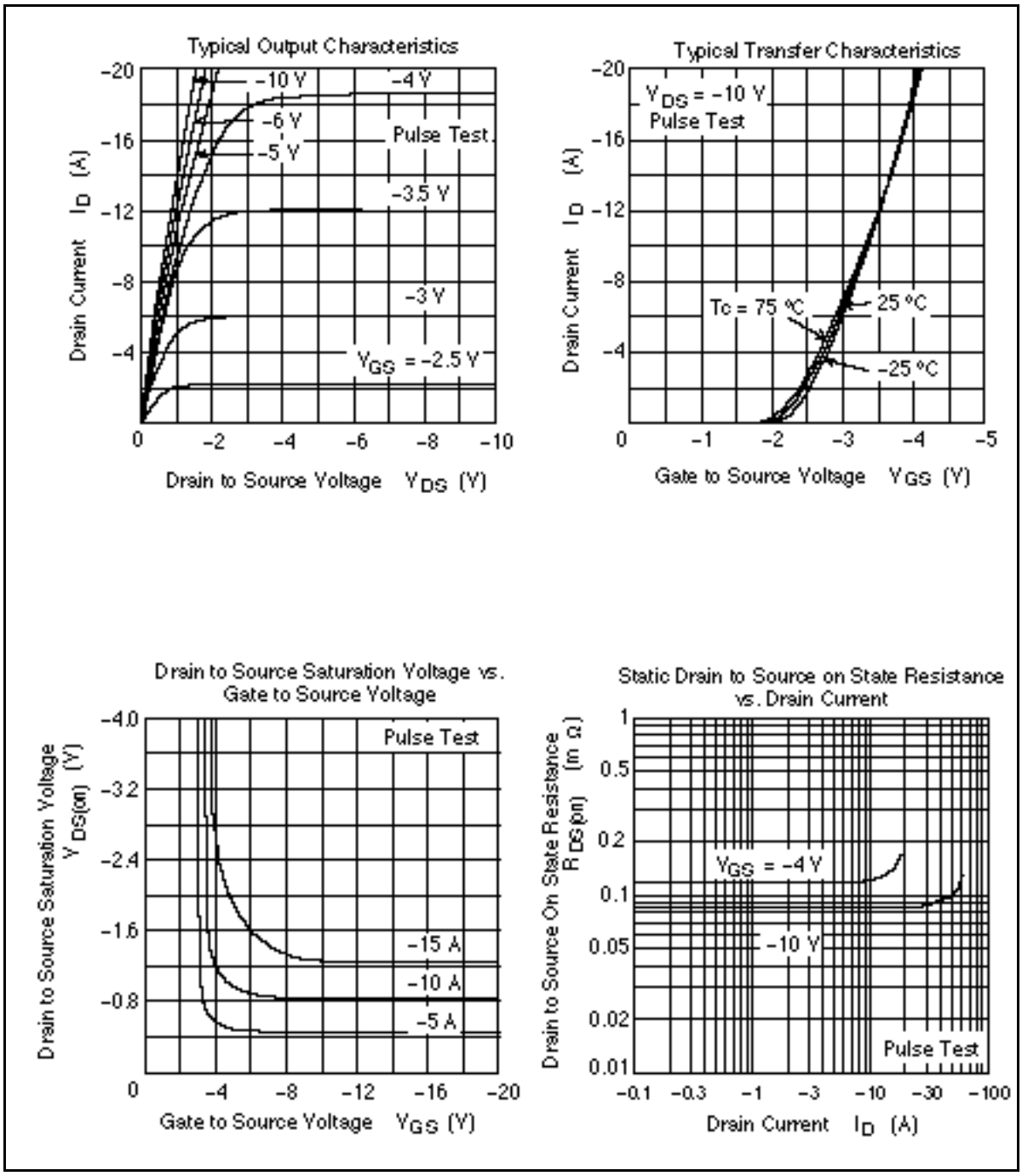

Switching Time Test Circuit



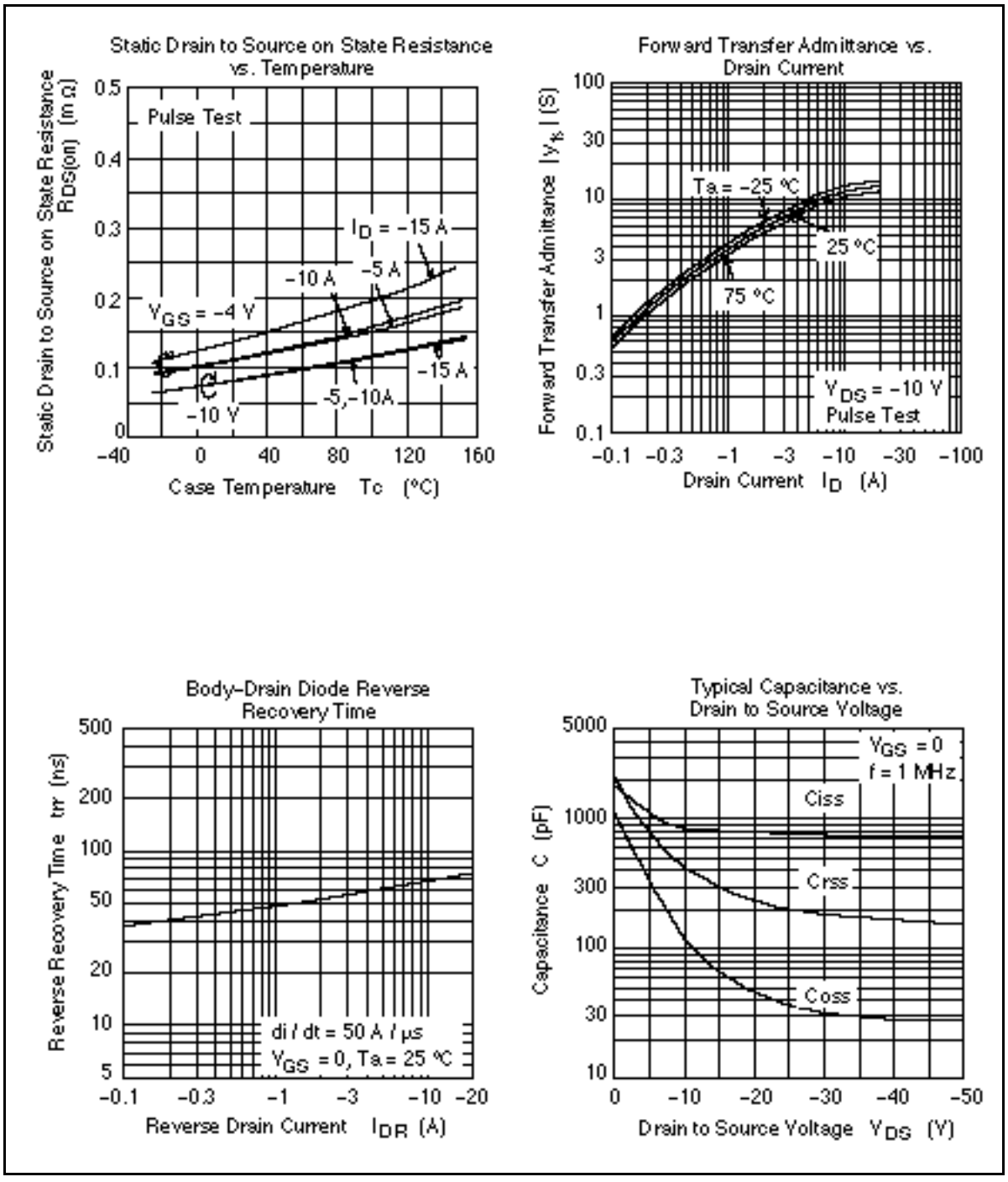

Waveform



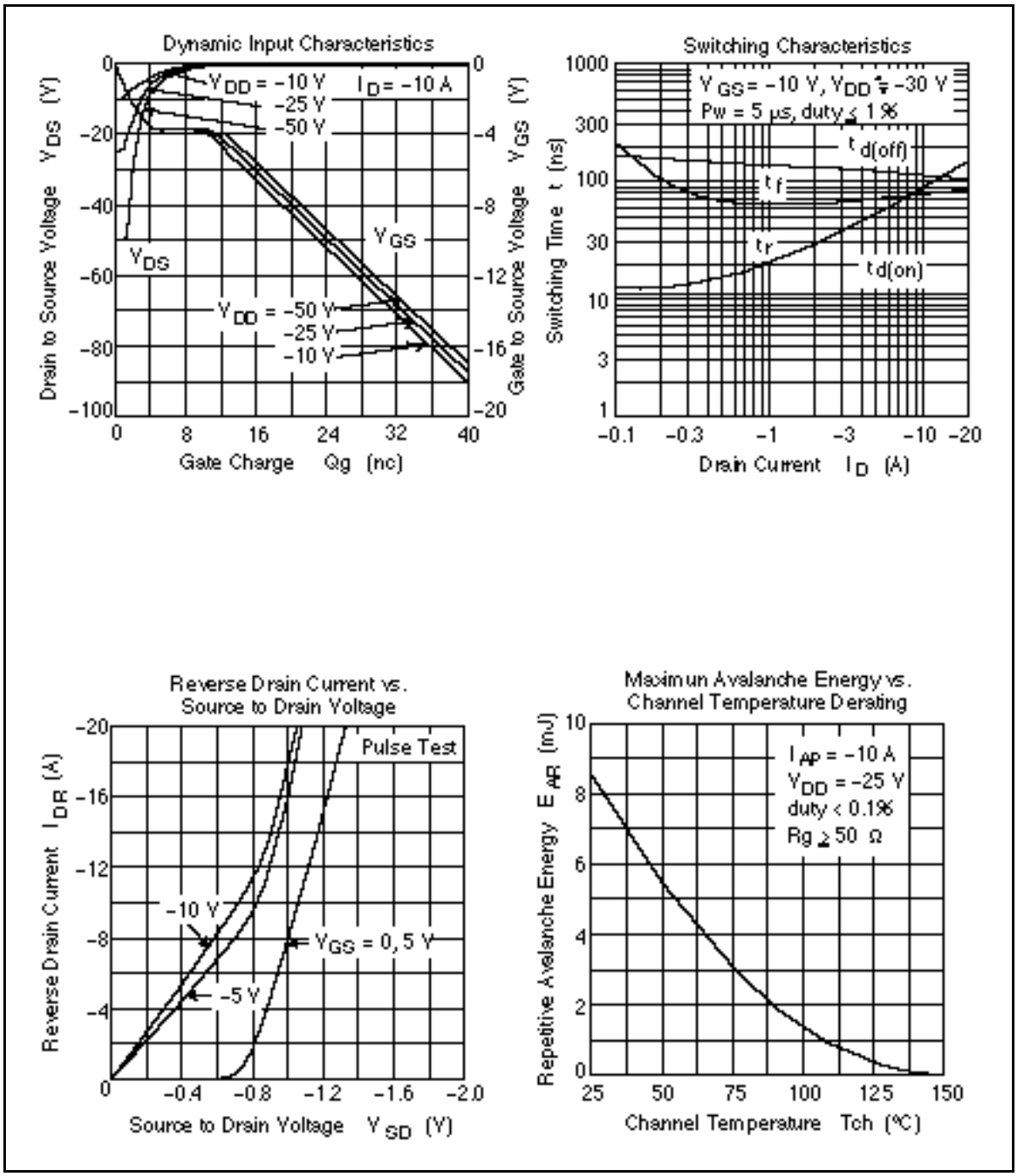
## Main Characteristics ( P Channel )



## Main Characteristics ( P Channel )

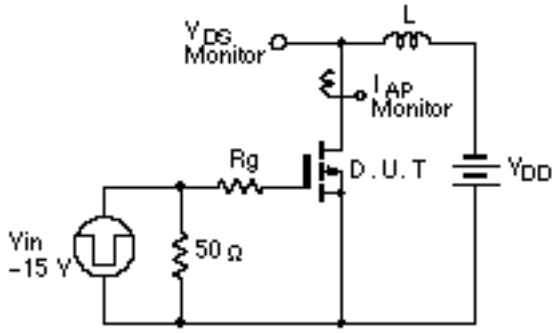


## Main Characteristics ( P Channel )



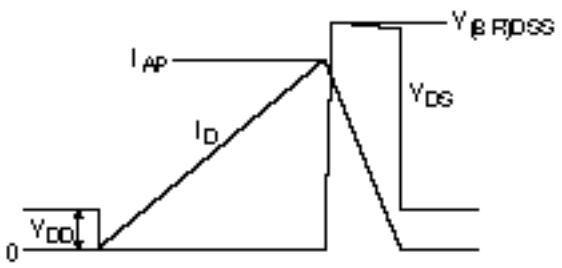
## Main Characteristics ( P Channel )

Avalanche Test Circuit

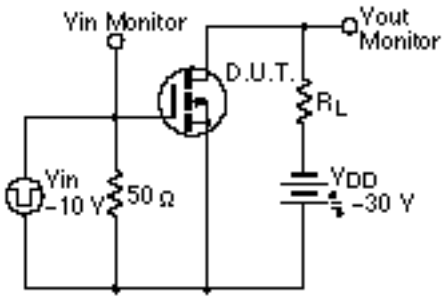



Avalanche Waveform

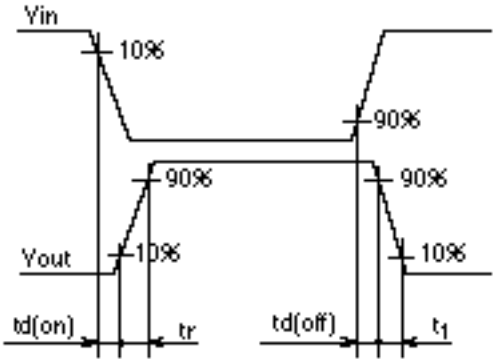
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$




Switching Time Test Circuit

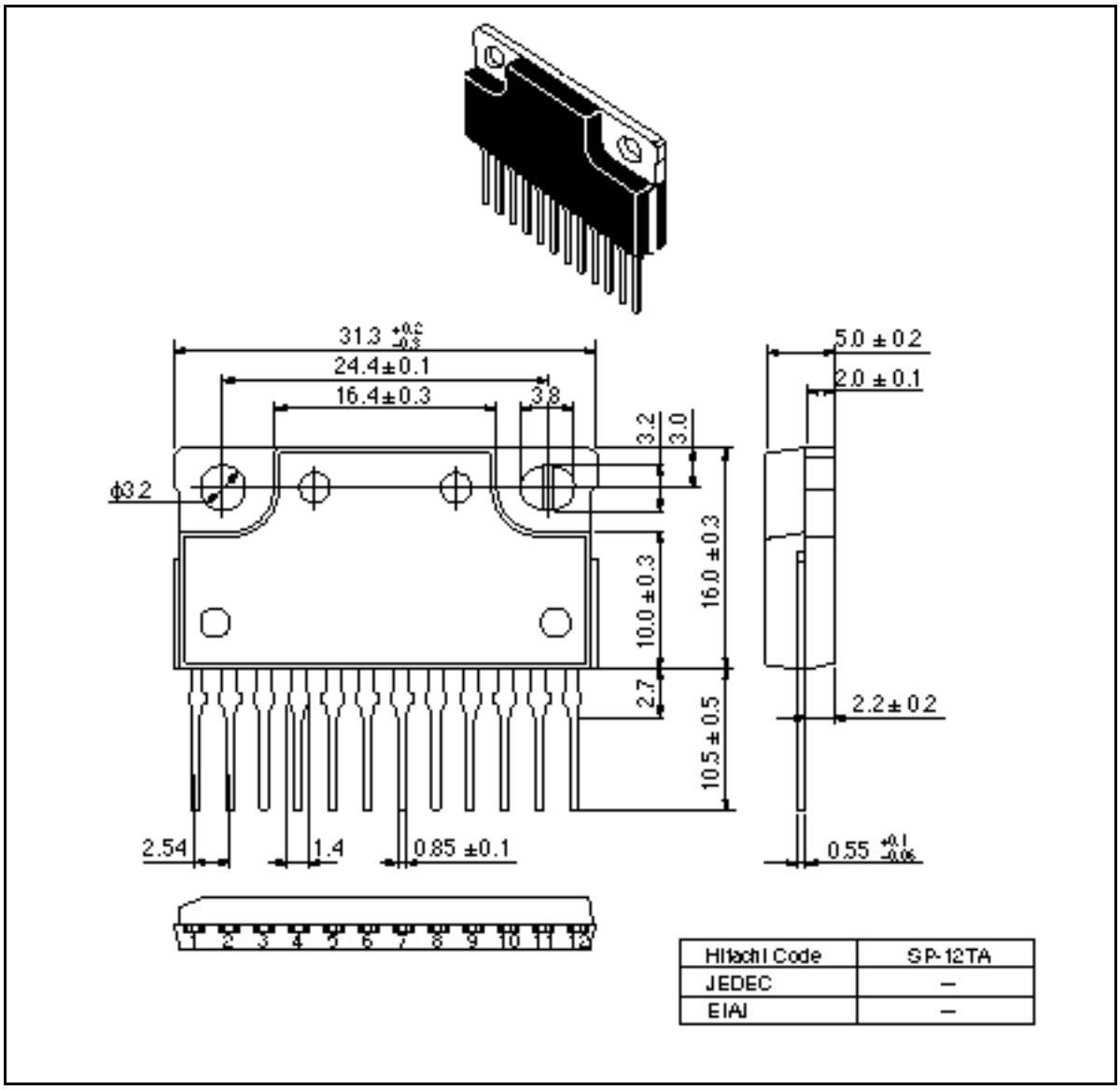



Waveform



## Package Dimensions

**Unit: mm**



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