

# 6AM15

Silicon N/P Channel MOS FET  
High Speed Power Switching

# HITACHI

ADE-208-719 (Z)

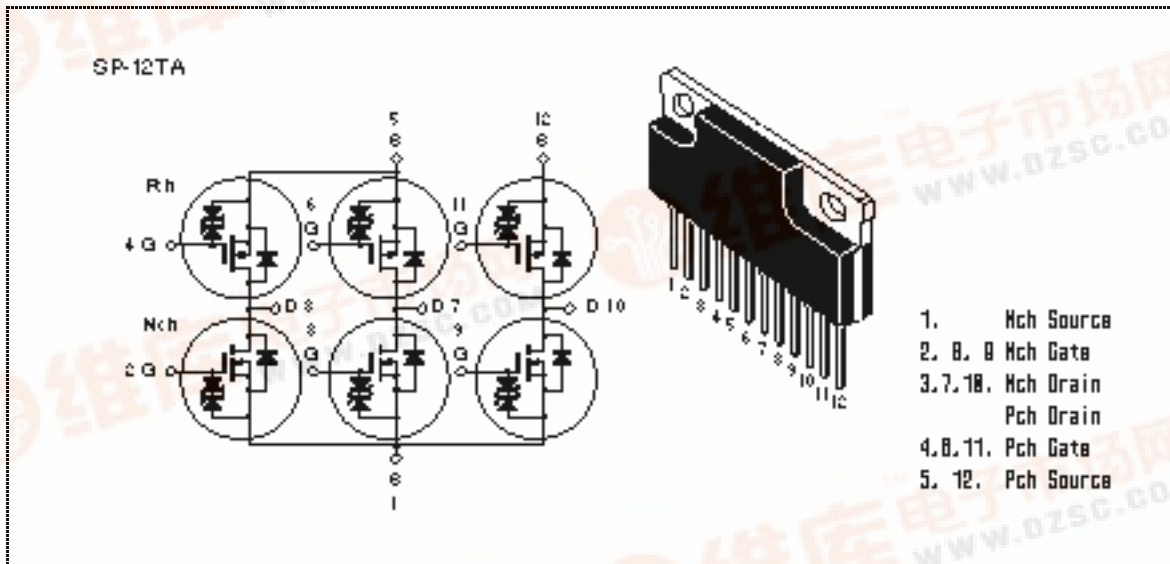
1st. Edition

February 1999

### Features

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

### Outline



## 6AM15

### 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	$P_{ch}$ (Tc = 25°C) Note2		42	W
Channel dissipation	$P_{ch}$ 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

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

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DS}$	60	—	—	V	$I_D = 10 \text{ mA}$ , $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GS}$	±20	—	—	V	$I_G = \pm 100 \mu\text{A}$ , $V_{DS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	±10	μA	$V_{GS} = \pm 16 \text{ V}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	10	μA	$V_{DS} = 60 \text{ V}$ , $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.5	—	2.5	V	$V_{DS} = 10 \text{ V}$ , $I_D = 1 \text{ mA}$
Static drain to source on state	$R_{DS(on)}$	—	0.045	0.060		$I_D = 5 \text{ A}$ , $V_{GS} = 10 \text{ V}$ Note5
resistance	$R_{DS(on)}$	—	0.070	0.115		$I_D = 5 \text{ A}$ , $V_{GS} = 4 \text{ V}$ Note5
Forward transfer admittance	$ y_{fs} $	5.5	9	—	S	$I_D = 5 \text{ A}$ , $V_{DS} = 10 \text{ V}$ Note5
Input capacitance	Ciss	—	500	—	pF	$V_{DS} = 10 \text{ V}$
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	$V_{GS} = 10 \text{ V}$ , $I_D = 5 \text{ A}$

Rise time	$t_r$	—	50	—	ns	$R_L = 6$
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	$I_F = 10\text{ A}, V_{GS} = 0$
Body-drain diode reverse recovery time	$t_{rr}$	—	52	—	ns	$I_F = 10\text{ A}, V_{GS} = 0$ $diF/dt = 50\text{ A}/\mu\text{s}$

Note: 5. Pulse test

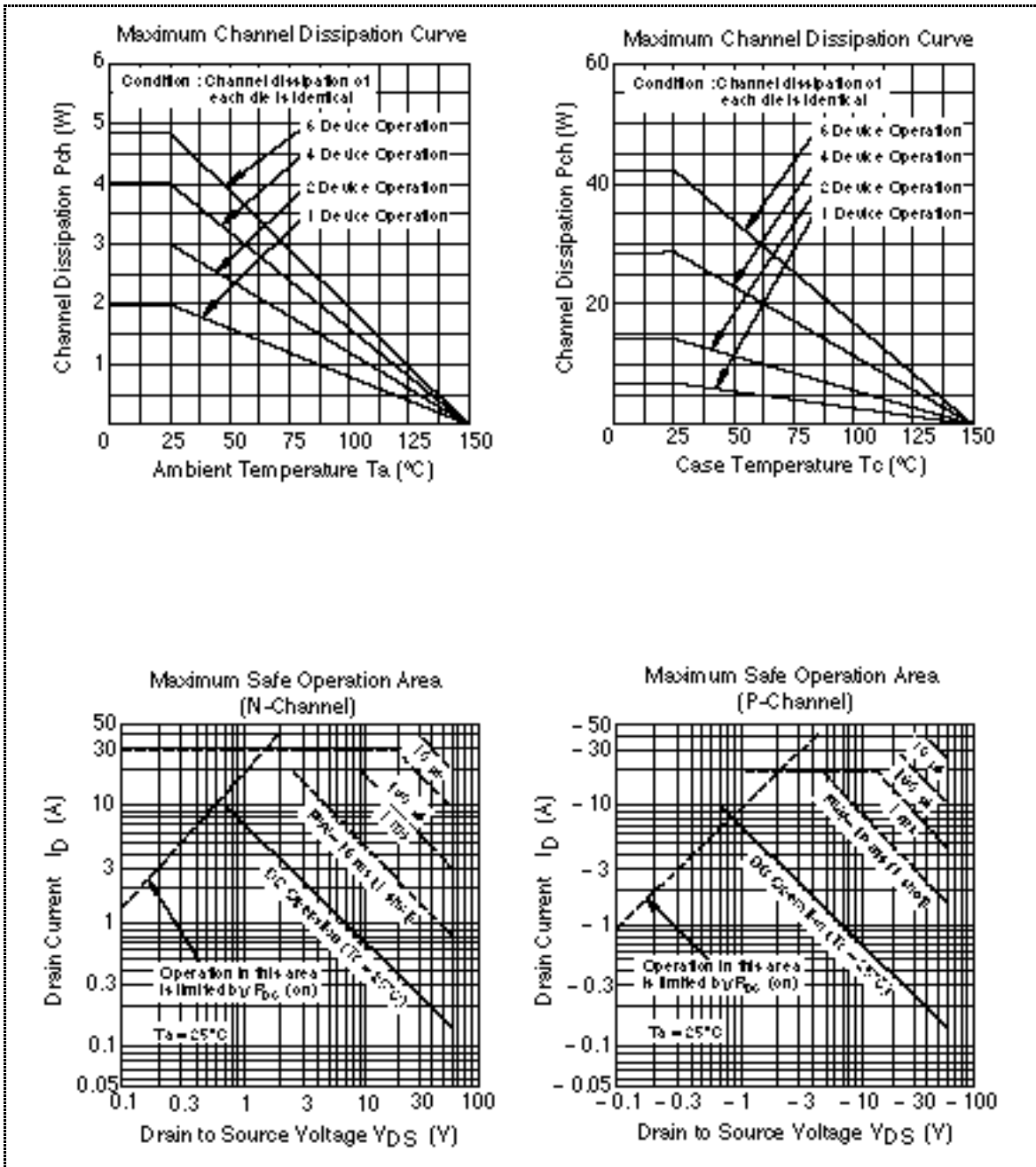
### Electrical Characteristics (P Channel) ( $T_a = 25^\circ\text{C}$ )

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DS}$	-60	—	—	V	$I_D = -10\text{ mA}, V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GS}$	$\pm 20$	—	—	V	$I_G = \pm 100\text{ }\mu\text{A}, V_{DS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	-10	$\mu\text{A}$	$V_{DS} = -60\text{ V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	-1.0	—	-2.0	V	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.085	0.105		$I_D = -5\text{ A}, V_{GS} = -10\text{ V}$ Note5
	$R_{DS(on)}$	—	0.115	0.165		$I_D = -5\text{ A}, V_{GS} = -4\text{ V}$ Note5
Forward transfer admittance	$ y_{fs} $	5.5	9	—	S	$I_D = -5\text{ A}, V_{DS} = -10\text{ V}$ Note5
Input capacitance	$C_{iss}$	—	850	—	pF	$V_{DS} = -10\text{ V}$
Output capacitance	$C_{oss}$	—	420	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	$C_{rss}$	—	110	—	pF	$f = 1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	12	—	ns	$V_{GS} = -10\text{ V}, I_D = -5\text{ A}$
Rise time	$t_r$	—	55	—	ns	$R_L = 6$
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	$I_F = -10\text{ A}, V_{GS} = 0$
Body-drain diode reverse recovery time	$t_{rr}$	—	65	—	ns	$I_F = -10\text{ A}, V_{GS} = 0$ $diF/dt = 50\text{ A}/\mu\text{s}$

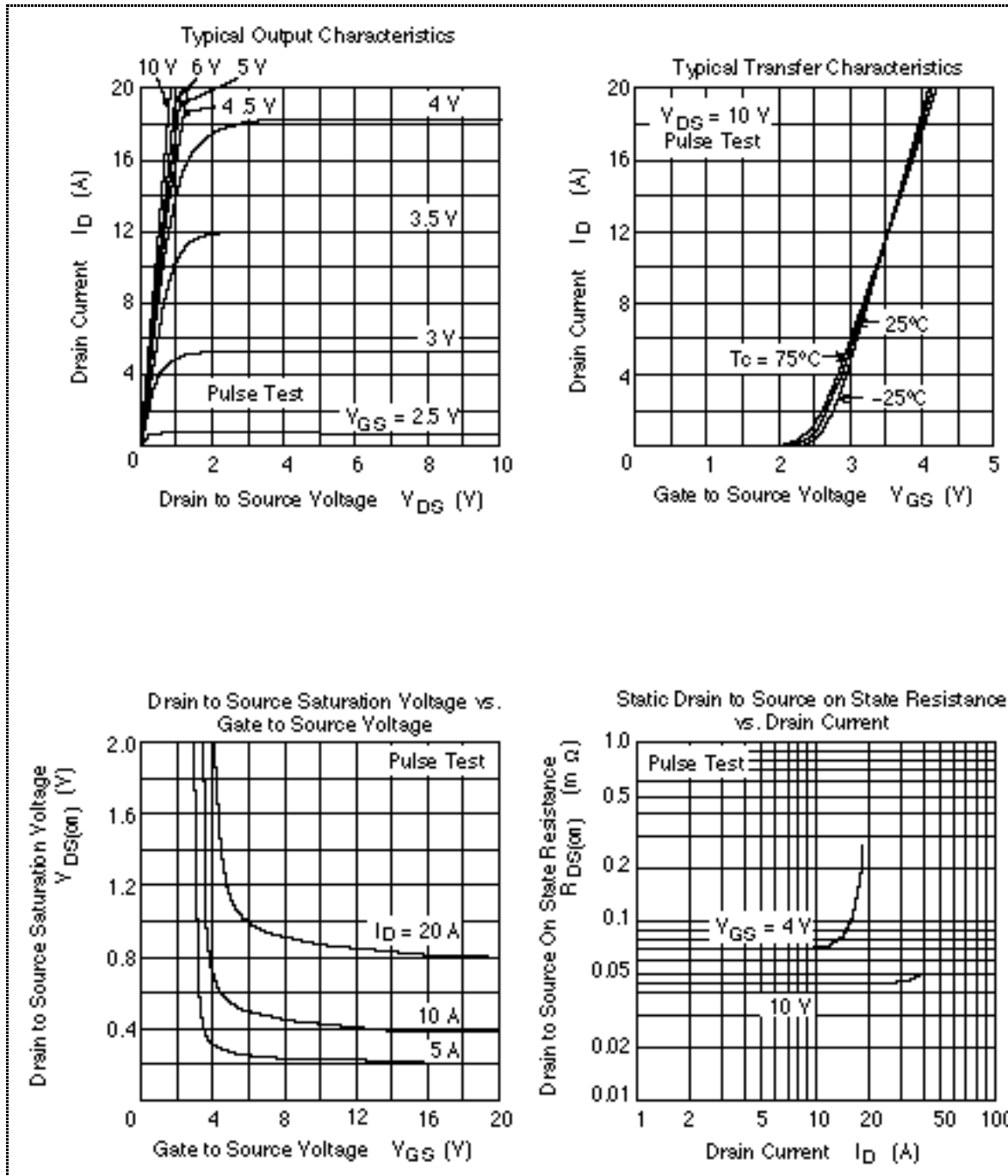
Note: 5. Pulse test

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## Main Characteristics

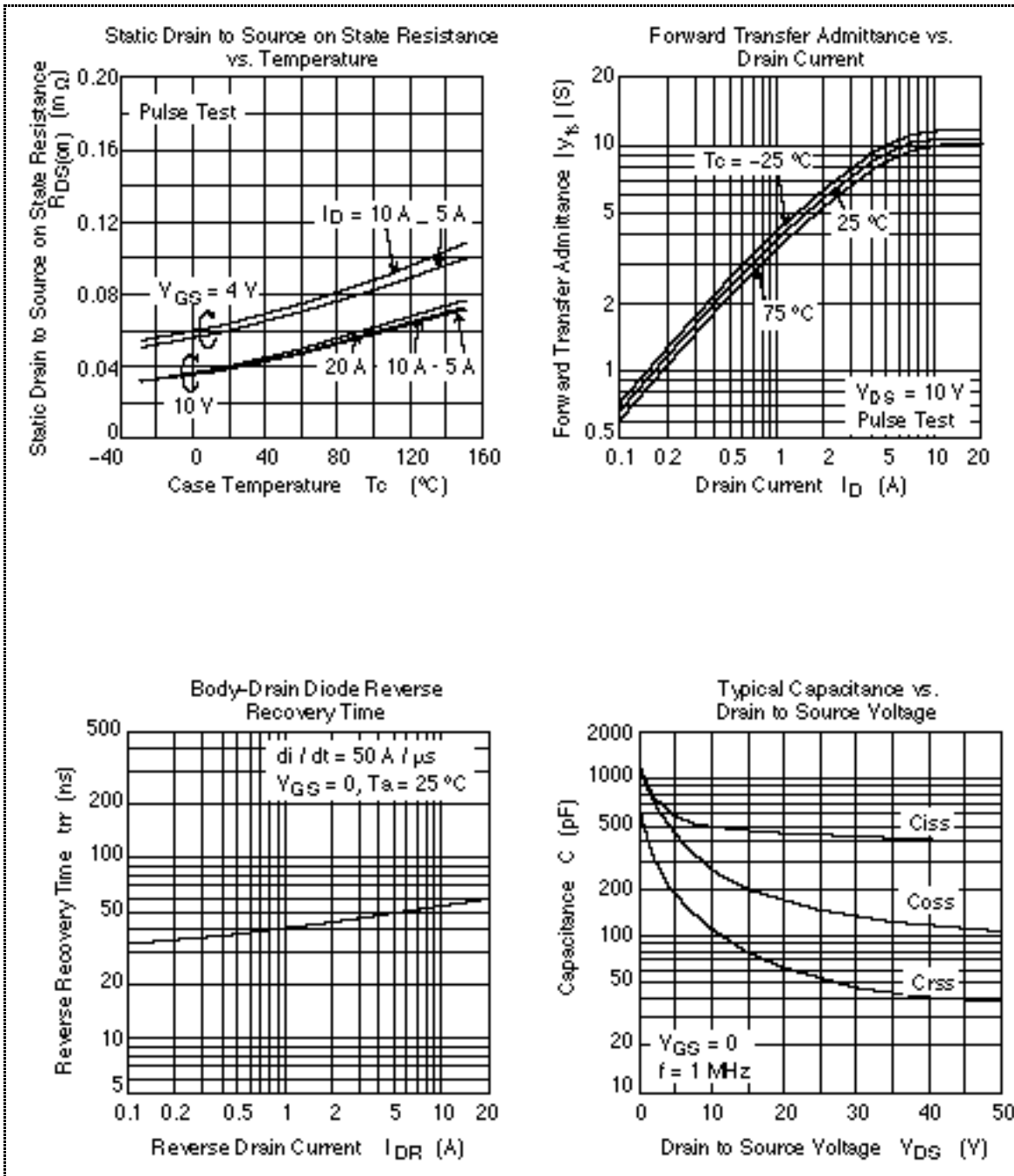


Main Characteristics ( N Channel )

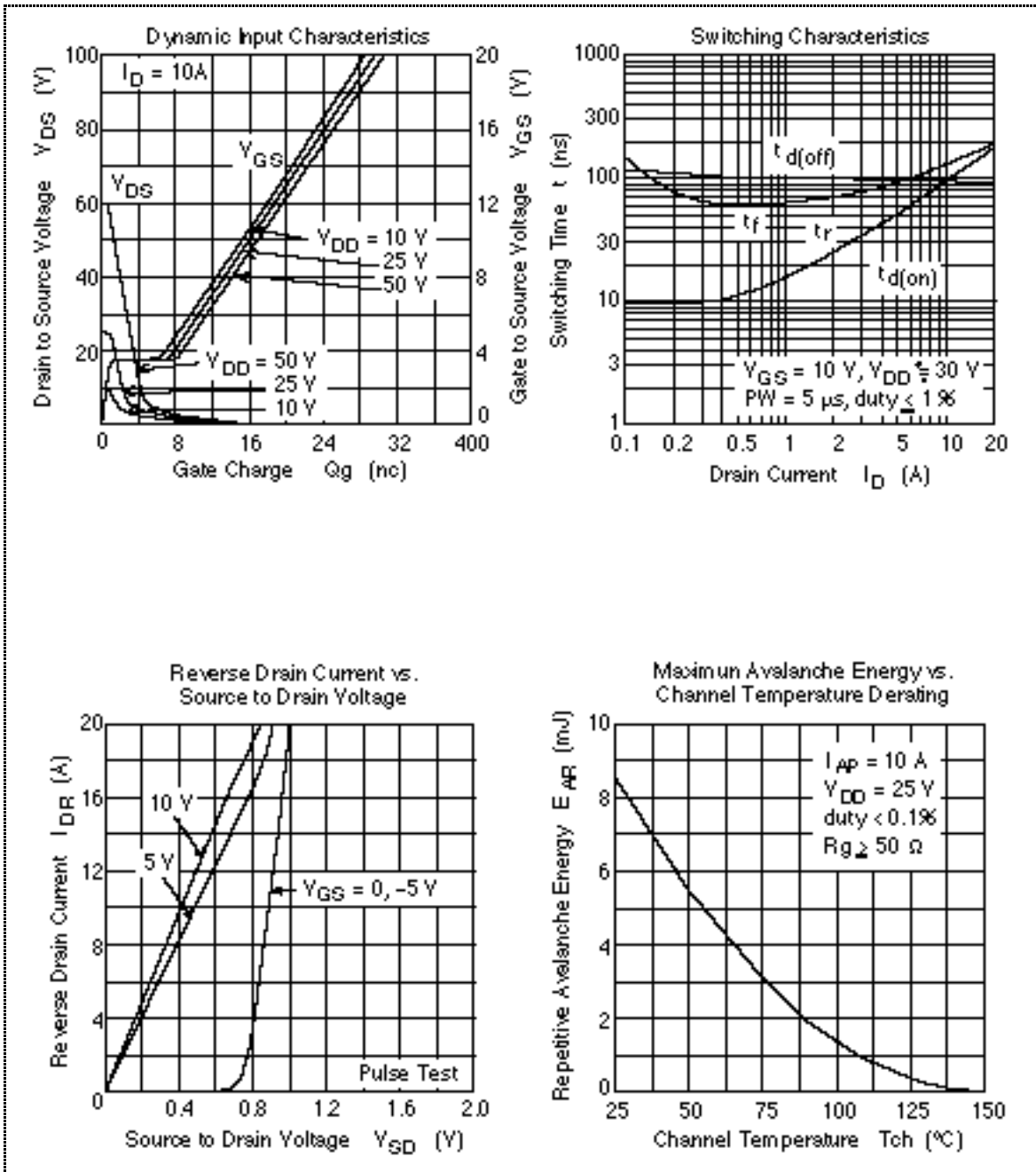


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## Main Characteristics ( N Channel )

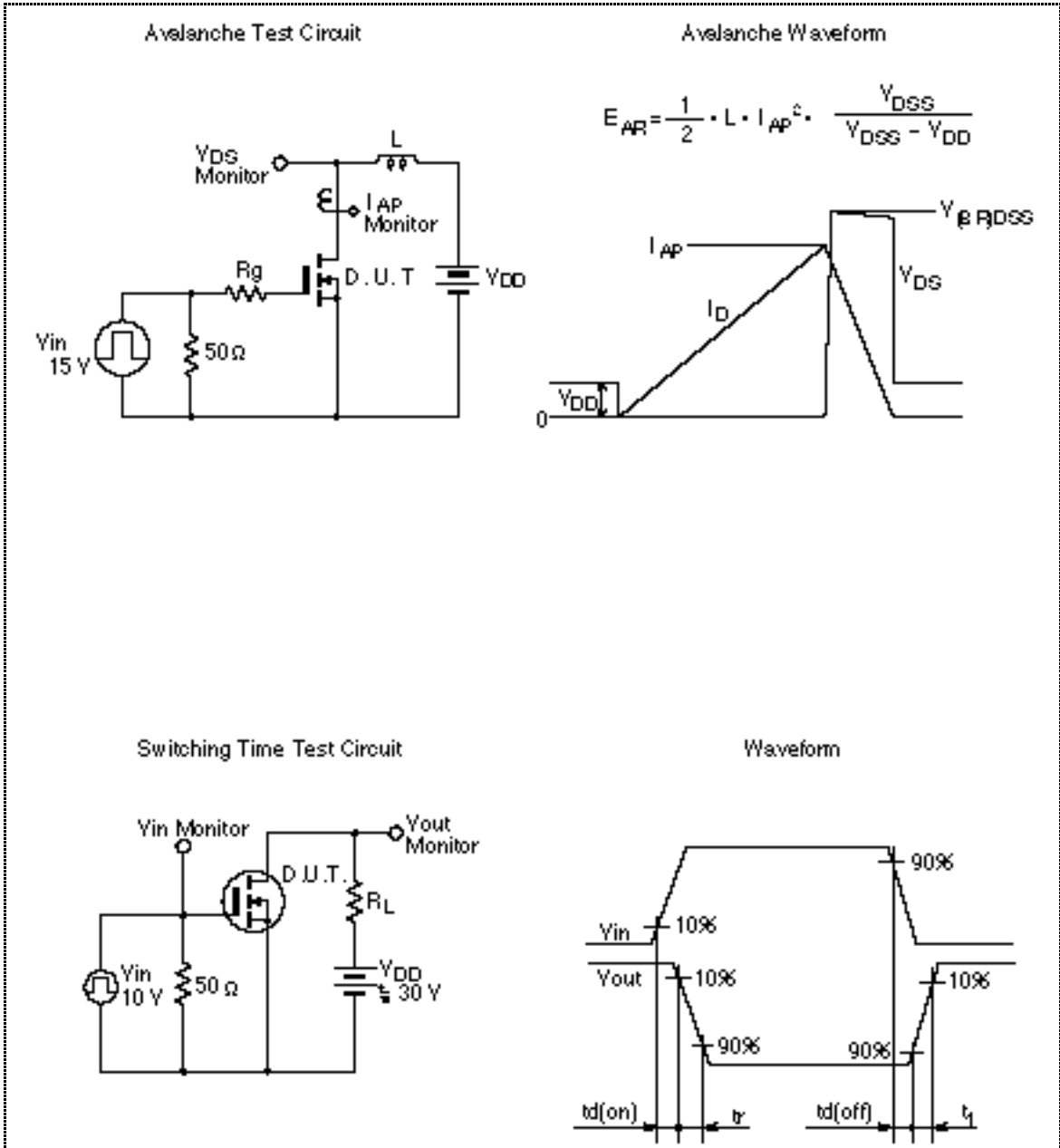


Main Characteristics ( N Channel )



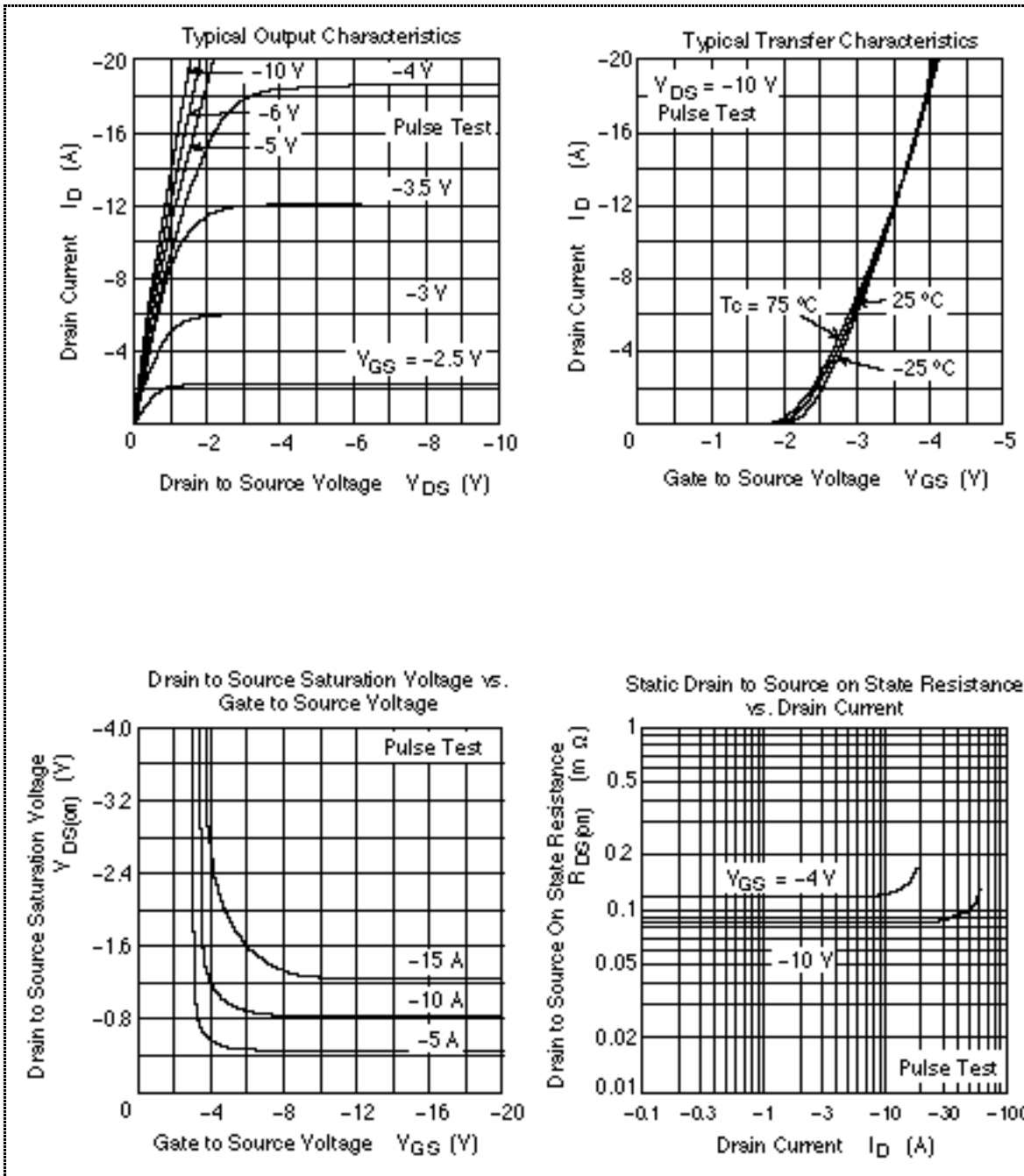
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### Main Characteristics ( N Channel )



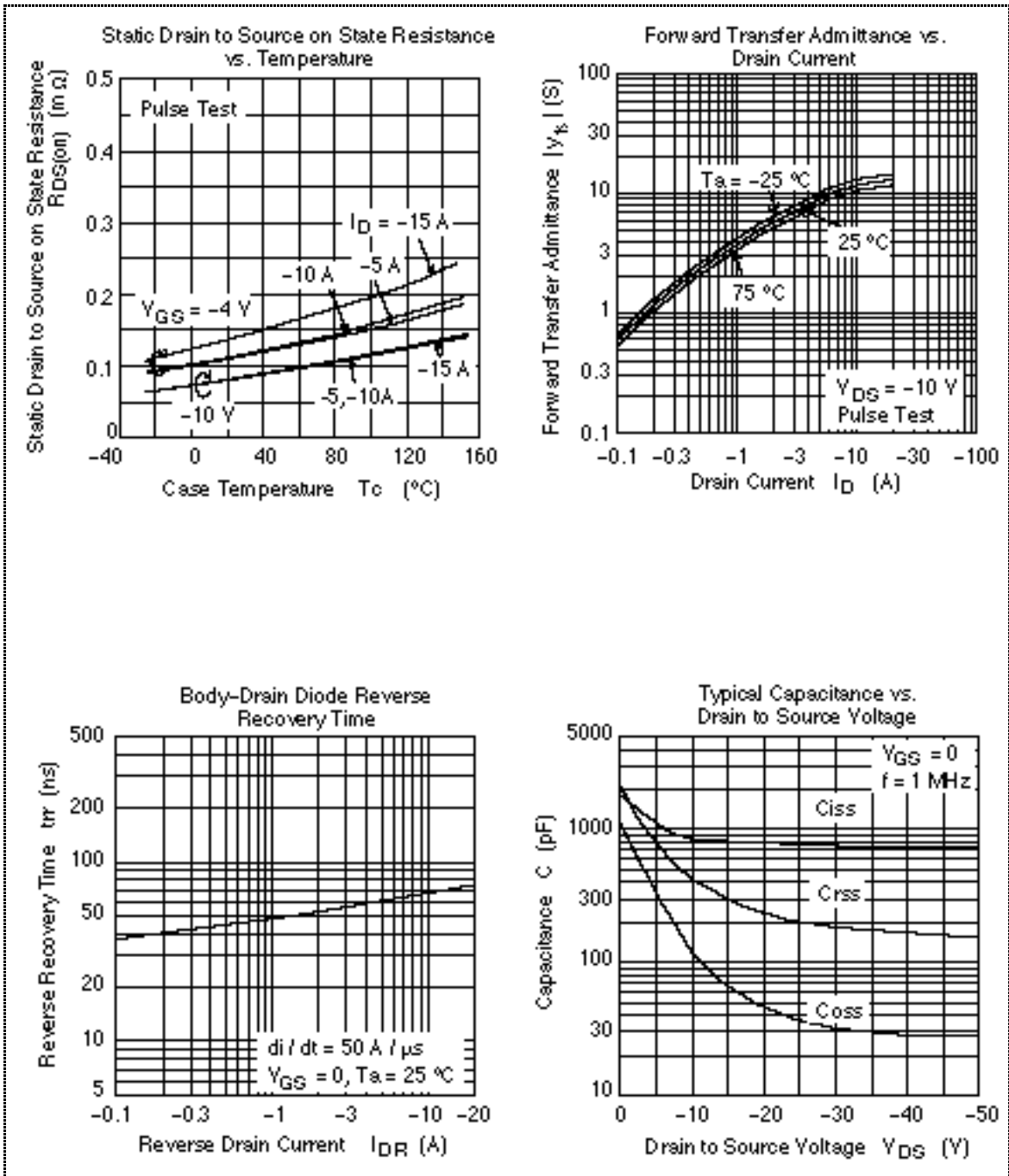


Main Characteristics ( P Channel )

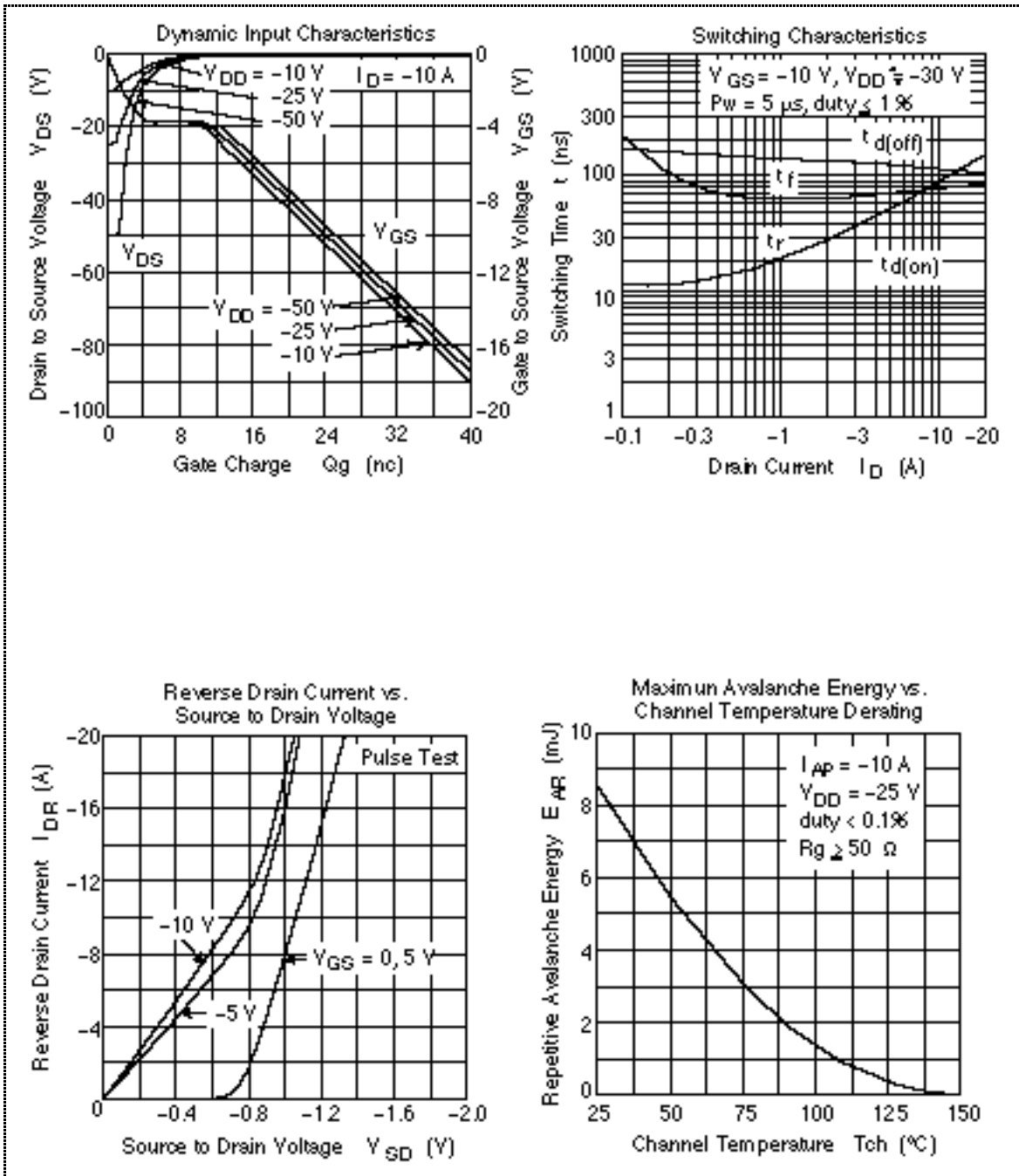


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### Main Characteristics ( P Channel )

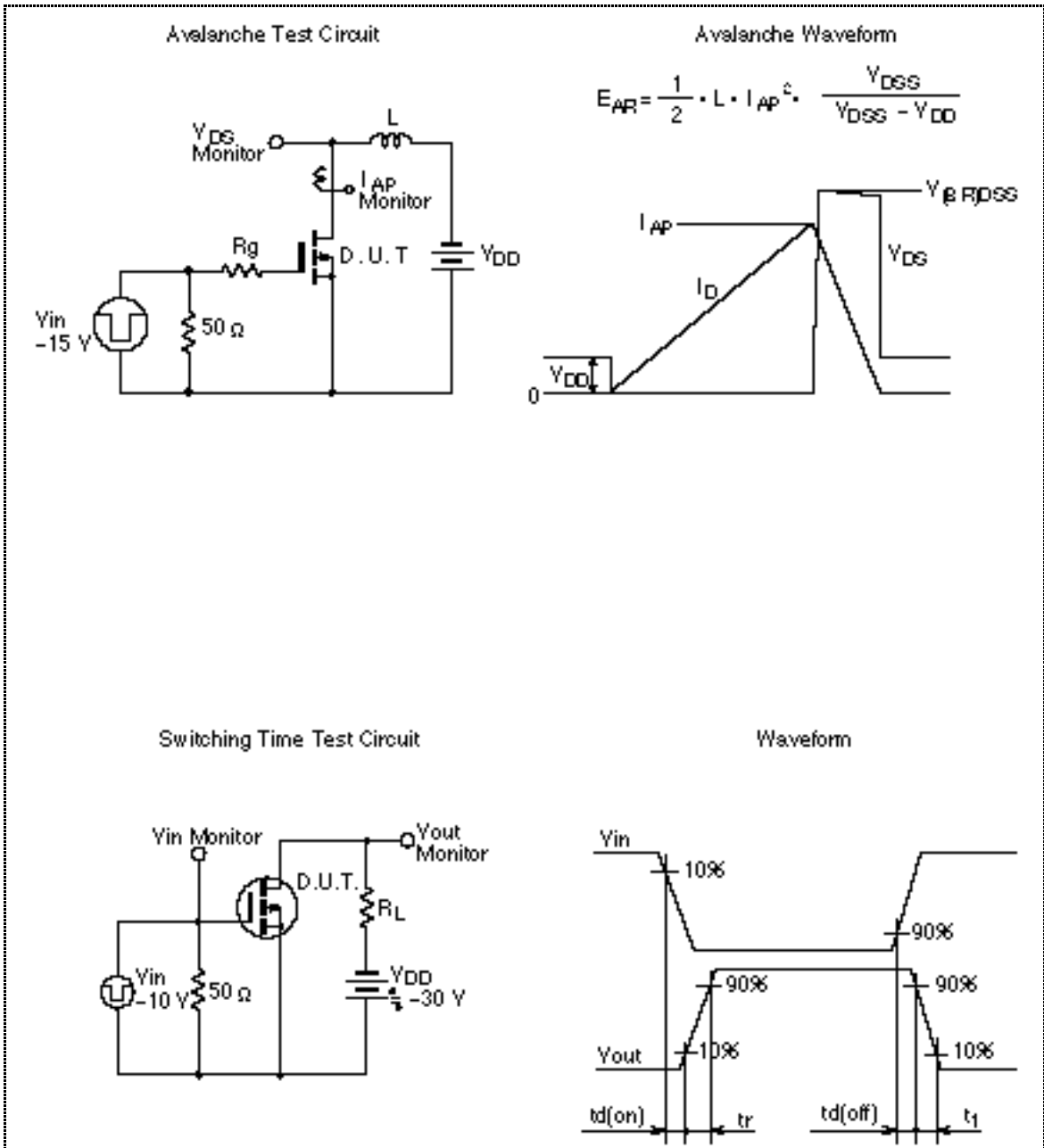


Main Characteristics ( P Channel )



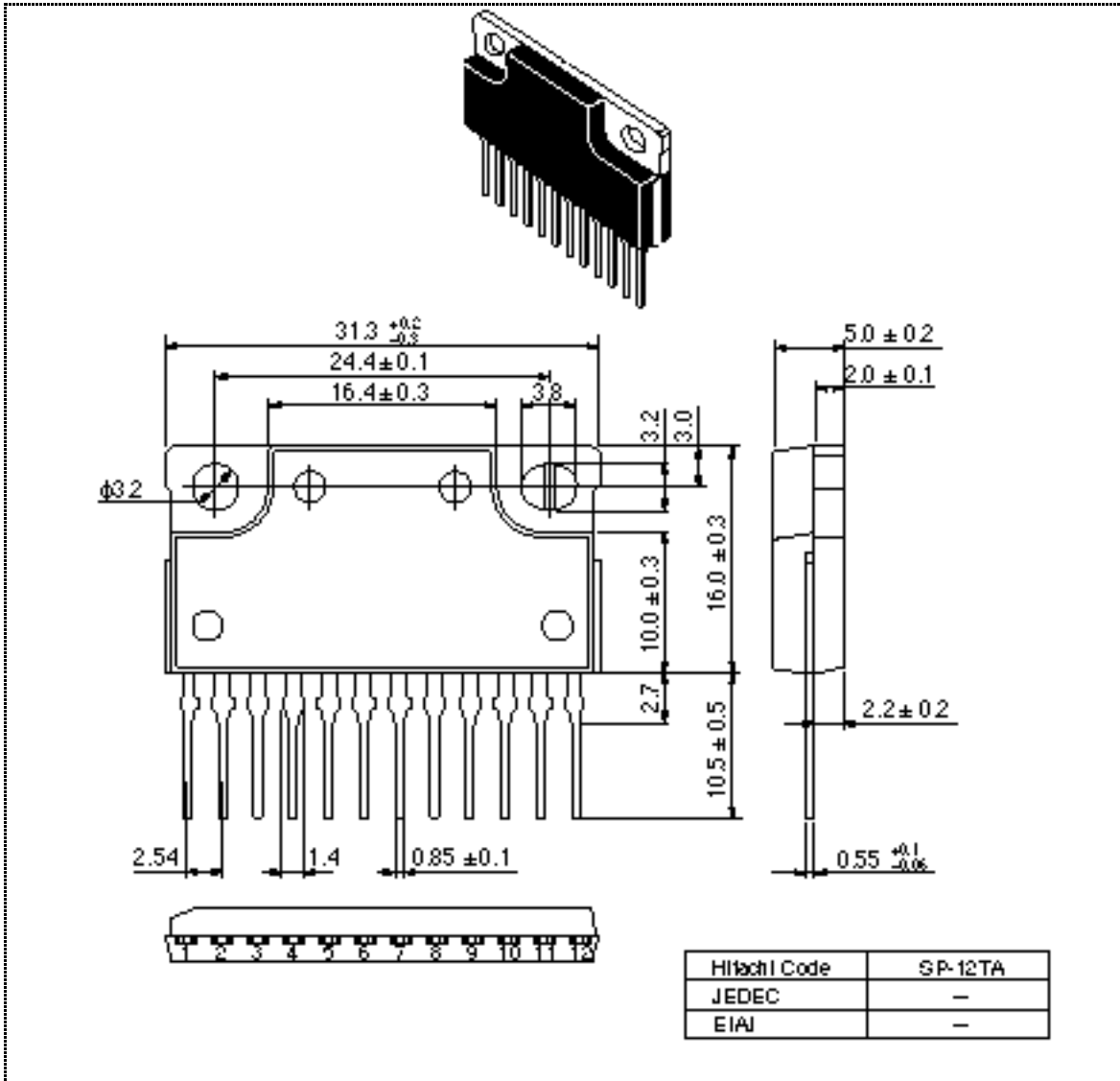
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### Main Characteristics ( P Channel )



Package Dimensions

Unit: mm



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