

TOSHIBA Field Effect Transistor Silicon N-P Channel MOS Type

## HN1L03FU

High Speed Switching Applications  
Analog Switch Applications

Unit in mm

### Q1, Q2 common

- Low threshold voltage  
Q1:  $V_{th} = 0.8 \sim 2.5V$  Q2:  $V_{th} = -0.5 \sim -1.5V$
- High speed
- Small package

### Q1 Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Drain-Source voltage	$V_{DS}$	50	V
Gate-Source voltage	$V_{GSS}$	10	V
Drain current	$I_D$	50	mA

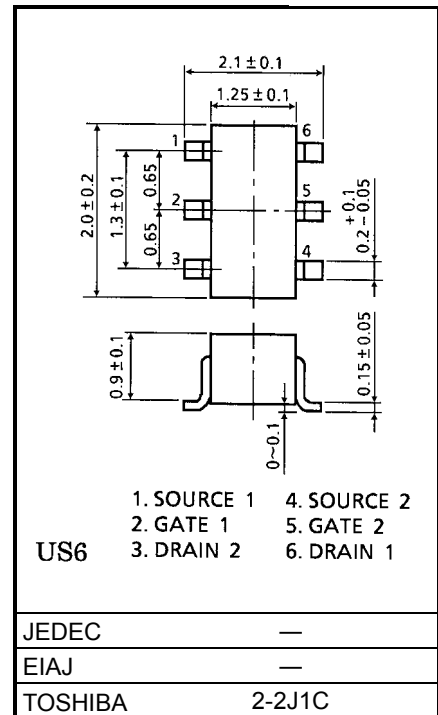
### Q2 Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Drain-Source voltage	$V_{DS}$	-20	V
Gate-Source voltage	$V_{GSS}$	-7	V
Drain current	$I_D$	-50	mA

### Maximum Ratings (Q1, Q2 Common) (Ta = 25°C)

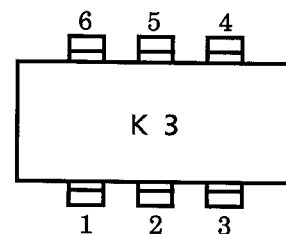
Characteristic	Symbol	Rating	Unit
Drain power dissipation	$P_{D^*}$	200	mW
Channel temperature	$T_{ch}$	150	°C
Storage temperature range	$T_{stg}$	-55~150	°C

\* Total rating

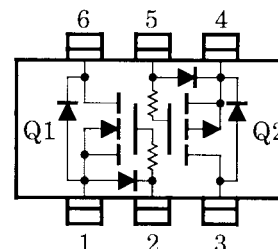


Weight: 6.8mg

### Marking



### Equivalent Circuit (Top View)



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## Q1 Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = 10V, V_{DS} = 0$	—	—	1	$\mu A$
Drain-Source breakdown voltage		$V_{(BR) DSS}$	$I_D = 100\mu A, V_{GS} = 0$	50	—	—	V
Drain cut-off current		$I_{DSS}$	$V_{DS} = 50V, V_{GS} = 0$	—	—	1	$\mu A$
Gate threshold voltage		$V_{th}$	$V_{DS} = 5V, I_D = 0.1mA$	0.8	—	2.5	V
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 5V, I_D = 10mA$	20	—	—	mS
Drain-Source ON resistance		$R_{DS(ON)}$	$I_D = 10mA, V_{GS} = 4.0V$	—	20	50	$\Omega$
Input capacitance		$C_{iss}$	$V_{DS} = 5V, V_{GS} = 0,$ $f = 1MHz$	—	6.3	—	pF
Reverse transfer capacitance		$C_{rss}$	$V_{DS} = 5V, V_{GS} = 0,$ $f = 1MHz$	—	1.3	—	pF
Output capacitance		$C_{oss}$	$V_{DS} = 5V, V_{GS} = 0,$ $f = 1MHz$	—	5.7	—	pF
Switching time	Turn-on time	$t_{on}$	$V_{DD} = 5V, I_D = 10mA,$ $V_{GS} = 0\sim 4.0V$	—	0.11	—	$\mu s$
	Turn-off time	$t_{off}$	$V_{DD} = 5V, I_D = 10mA,$ $V_{GS} = 0\sim 4.0V$	—	0.15	—	$\mu s$

## Q2 Electrical Characteristics (Ta = 25°C)

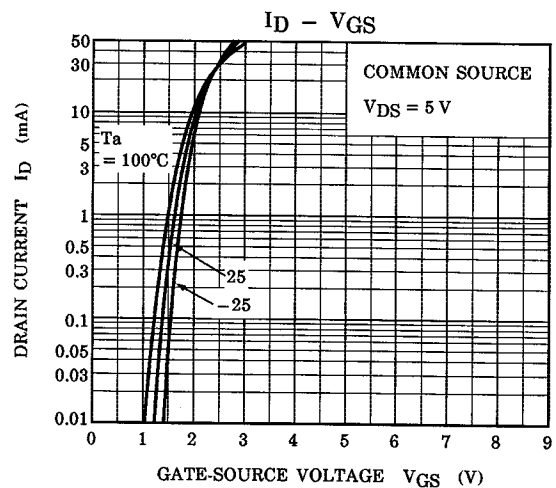
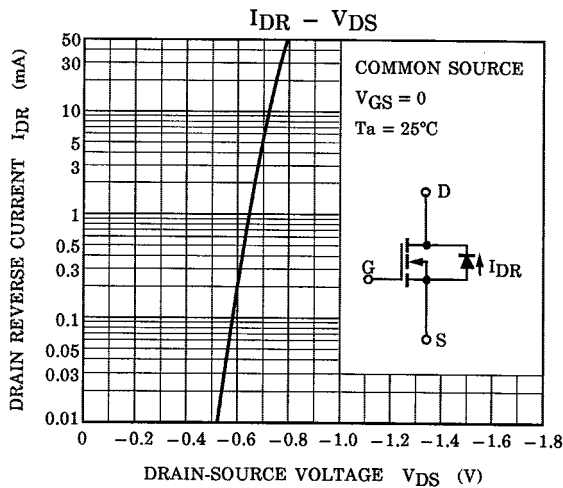
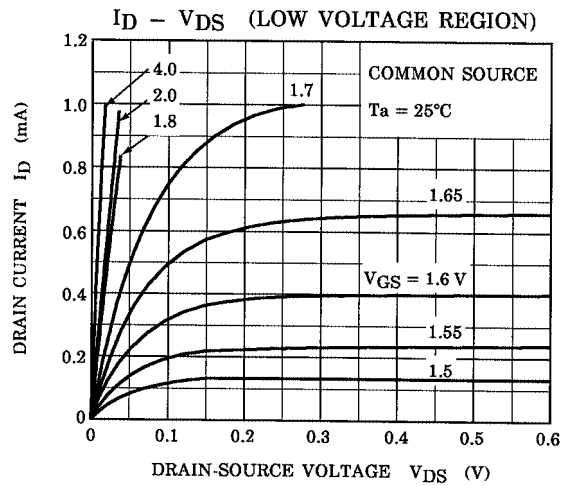
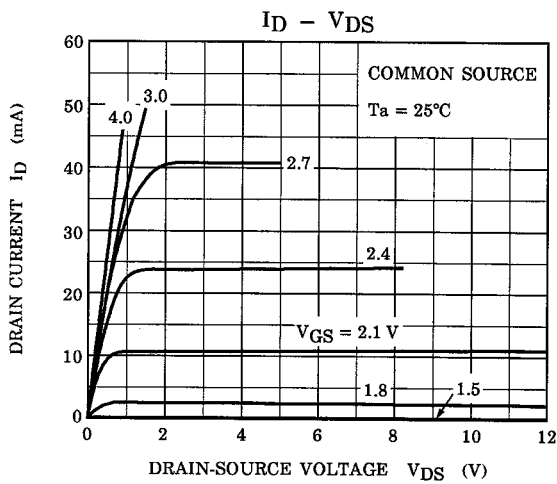
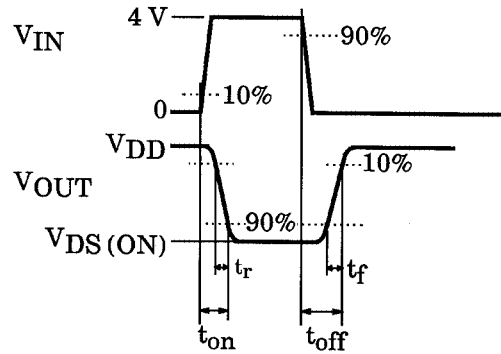
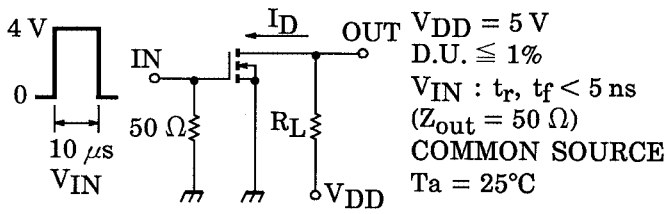
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = -7V, V_{DS} = 0$	—	—	-1	$\mu A$
Drain-Source breakdown voltage		$V_{(BR) DSS}$	$I_D = -100\mu A, V_{GS} = 0$	-20	—	—	V
Drain cut-off current		$I_{DSS}$	$V_{DS} = -20V, V_{GS} = 0$	—	—	-1	$\mu A$
Gate threshold voltage		$V_{th}$	$V_{DS} = -3V, I_D = -0.1mA$	-0.5	—	-1.5	V
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -3V, I_D = -10mA$	15	—	—	mS
Drain-Source ON resistance		$R_{DS(ON)}$	$I_D = -10mA, V_{GS} = -2.5V$	—	20	40	$\Omega$
Input capacitance		$C_{iss}$	$V_{DS} = -3V, V_{GS} = 0,$ $f = 1MHz$	—	10.4	—	pF
Reverse transfer capacitance		$C_{rss}$	$V_{DS} = -3V, V_{GS} = 0,$ $f = 1MHz$	—	2.8	—	pF
Output capacitance		$C_{oss}$	$V_{DS} = -3V, V_{GS} = 0,$ $f = 1MHz$	—	8.4	—	pF
Switching time	Turn-on time	$t_{on}$	$V_{DD} = -3V, I_D = -10mA,$ $V_{GS} = 0\sim -2.5V$	—	0.15	—	$\mu s$
	Turn-off time	$t_{off}$	$V_{DD} = -3V, I_D = -10mA,$ $V_{GS} = 0\sim -2.5V$	—	0.13	—	$\mu s$

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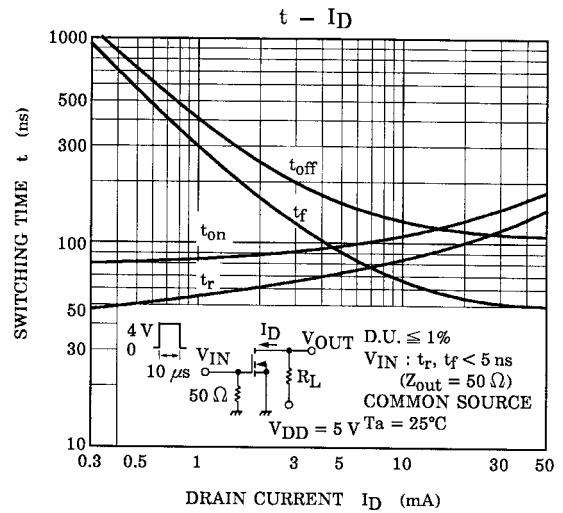
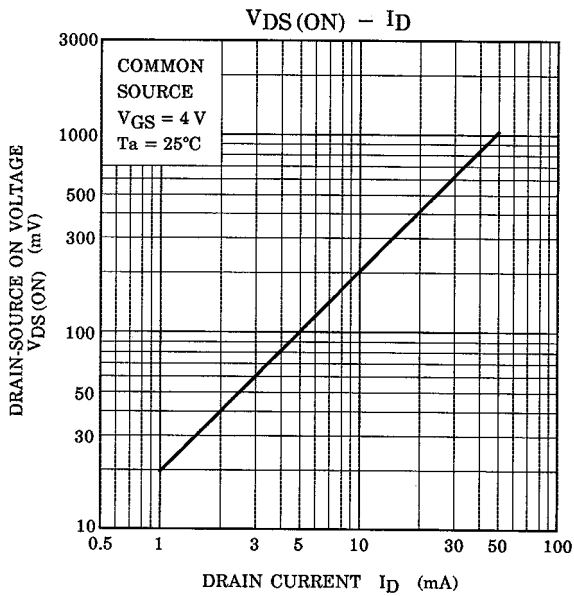
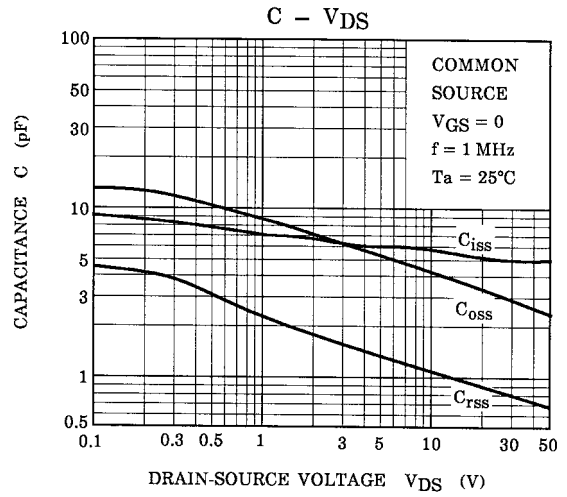
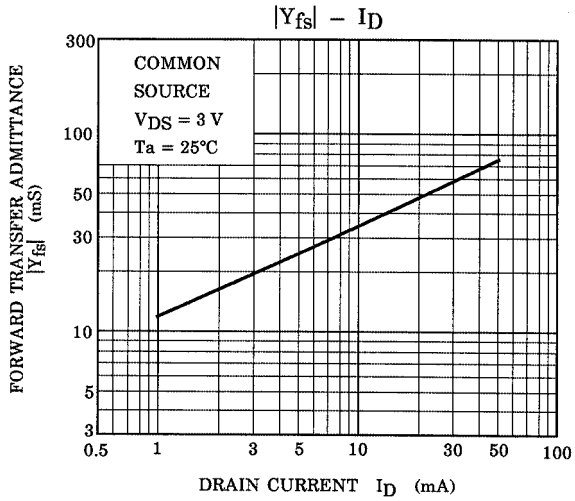
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## Q1 (Nch MOS FET)

### Switching Time Test Circuit

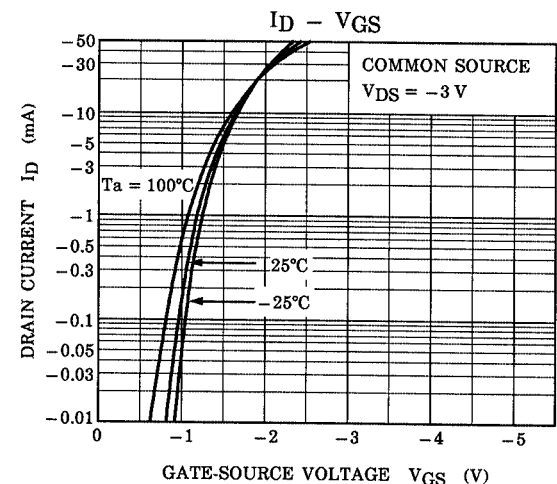
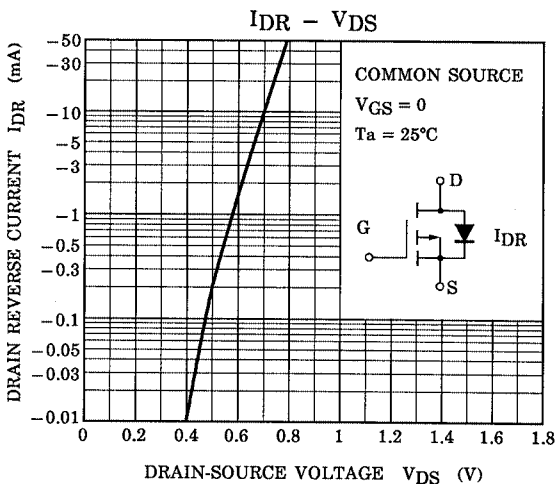
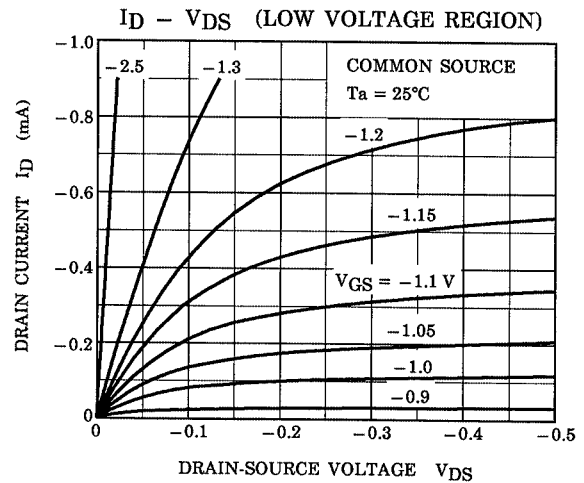
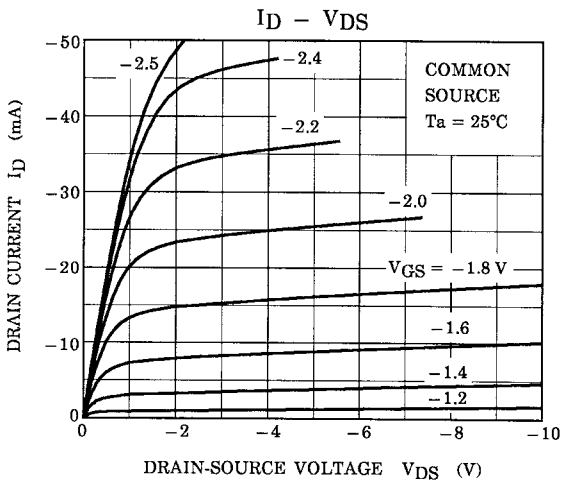
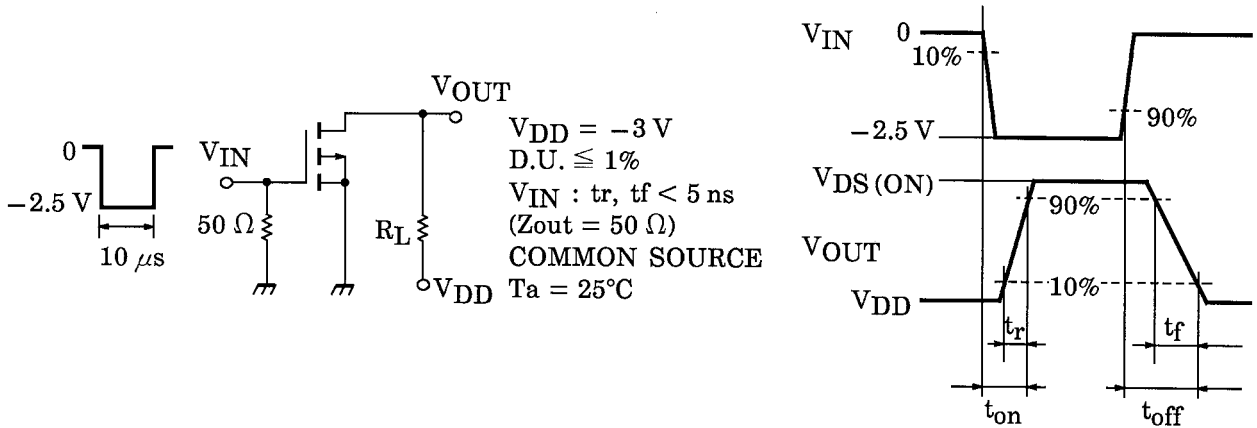


## Q1 (Nch MOS FET)

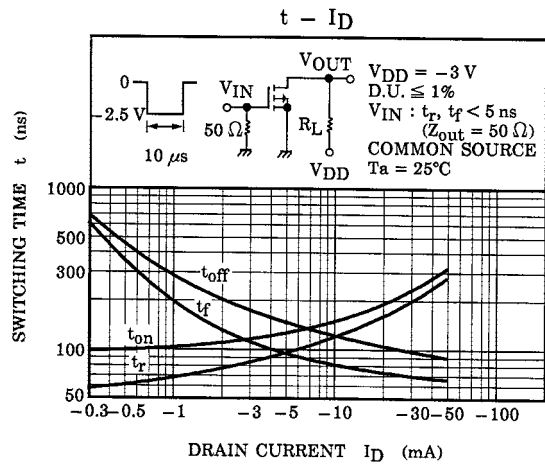
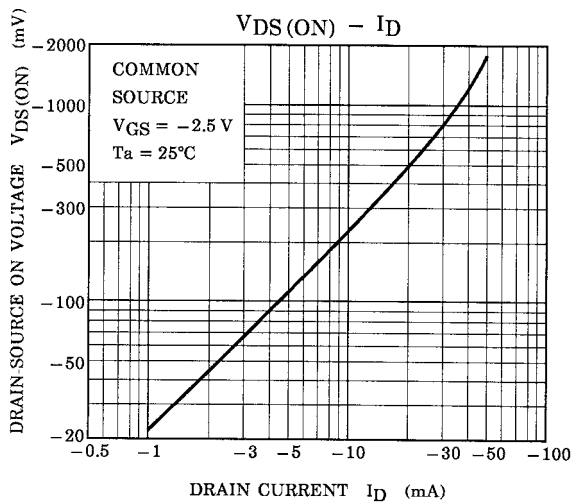
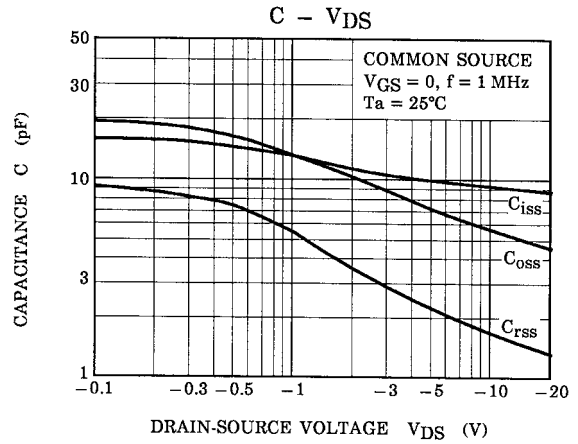
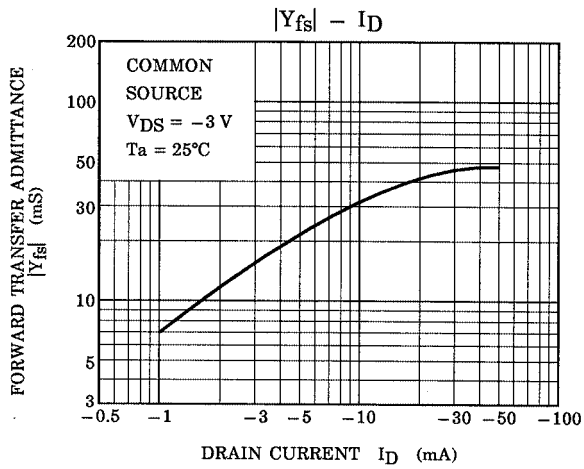


**Q2 (Pch MOS FET)**

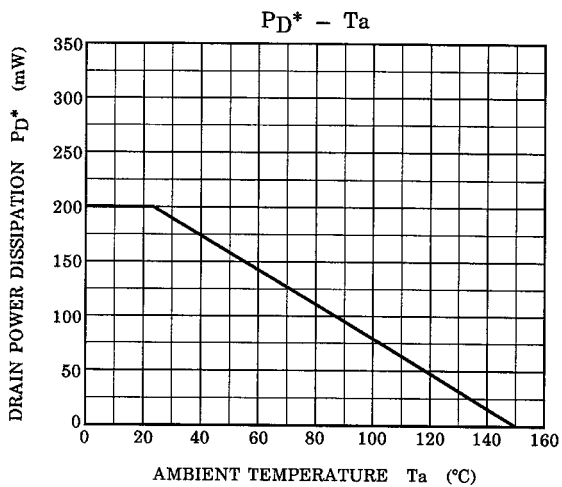
**Switching Time Test Circuit**



## Q2 (Pch MOS FET)



## (Q1, Q2 common)



\* : Total Rating