

### Field Effect Transistor

#### Silicon N Channel MOS Type ( $L^2$ - $\pi$ -MOS IV)

High Speed Switching, DC-DC Converter,  
Relay Drive, Motor Drive Applications

#### Features

- 4-Volt Gate Drive
- Low Drain-Source ON Resistance
  - $R_{DS(ON)} = 15m\Omega$  (Typ.)
- High Forward Transfer Admittance
  - $|Y_{fs}| = 26S$  (Typ.)
- Low Leakage Current
  - $I_{DSS} = 100\mu A$  (Max.) @  $V_{DS} = 60V$
- Enhancement-Mode
  - $V_{th} = 0.8 \sim 2.0V$  @  $V_{DS} = 10V, I_D = 1mA$

#### Absolute Maximum Ratings ( $T_a = 25C$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	60	V
Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )	$V_{DGR}$	60	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	45
	Pulse	$I_{DP}$	180
Drain Power Dissipation ( $T_c = 25^\circ C$ )	$P_D$	100	W
Channel Temperature	$T_{ch}$	150	$^\circ C$
Storage Temperature Range	$T_{lg}$	-55 ~ 150	$^\circ C$

#### Thermal Characteristics

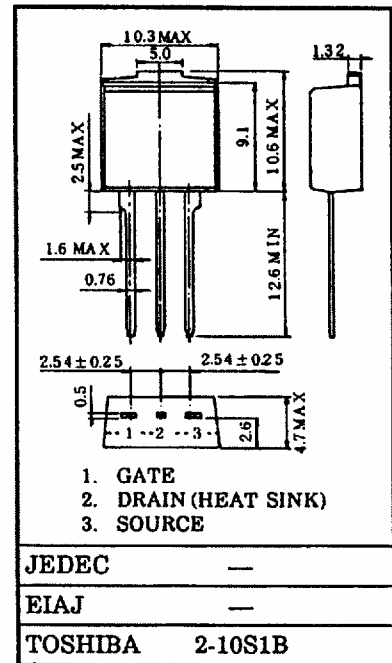
CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{\theta(ch-c)}$	1.25	$^\circ C/W$
Thermal Resistance, Channel to Ambient	$R_{\theta(ch-a)}$	83.3	$^\circ C/W$

This transistor is an electrostatic sensitive device.  
Please handle with care.

### Industrial Applications

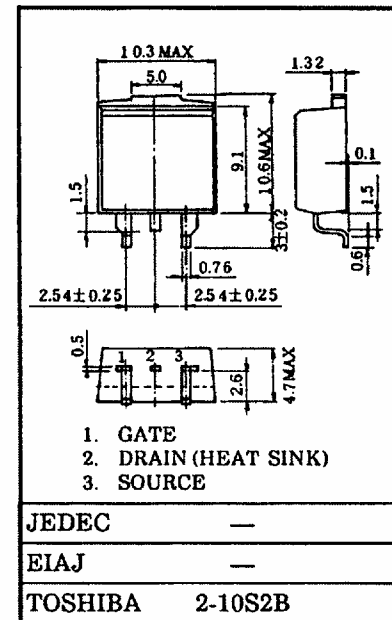
#### TO-220FL

Unit in mm



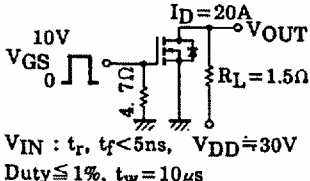
#### TO-220SM

Unit in mm



Weight: 1.5g

## Electrical Characteristics (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Drain Cut-off Current		$I_{DSS}$	$V_{DS} = 60V, V_{GS} = 0V$	-	-	100	$\mu A$
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10mA, V_{GS} = 0V$	60	-	-	V
Gate Threshold Voltage		$V_{th}$	$V_{DS} = 10V, I_D = 1mA$	0.8	-	2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 4V, I_D = 20A$	-	22	35	$\Omega$
			$V_{GS} = 10V, I_D = 20A$	-	15	20	
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10V, I_D = 20A$	18	26	-	S
Input Capacitance		$C_{iss}$	$V_{DS} = 10V, V_{GS} = 0V,$ $f = 1MHz$	-	2750	3800	pF
Reverse Transfer Capacitance		$C_{rss}$		-	600	1000	
Output Capacitance		$C_{oss}$		-	1500	2200	
Switching Time	Rise Time	$t_r$	 <p><math>I_D = 20A</math> <math>V_{GS} = 10V</math> <math>R_L = 1.5\Omega</math> <math>V_{IN} : t_r, t_f &lt; 5ns, V_{DD} = 30V</math> Duty <math>\leq 1\%</math>, <math>t_w = 10\mu s</math></p>	-	20	40	ns
	Turn-on Time	$t_{on}$		-	60	120	
	Fall Time	$t_f$		-	80	160	
	Turn-off Time	$t_{off}$		-	210	400	
Total Gate Charge (Gate-Source Plus Gate-Drain)		$Q_g$	$V_{DD} = 48V, V_{GS} = 10V,$ $I_D = 45A$	-	200	400	nC
Gate-Source Charge		$Q_{gs}$		-	135	-	
Gate-Drain ("Miller") Charge		$Q_{gd}$		-	65	-	

## Source-Drain Diode Ratings and Characteristics (Ta = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	$I_{DR}$	-	-	-	45	A
Pulse Drain Reverse Current	$I_{DRP}$	-	-	-	180	A
Diode Forward Voltage	$V_{DSF}$	$I_{DR} = 45A, V_{GS} = 0V$	-	-	-2.0	V
Reverse Recovery Time	$t_{rr}$	$I_{DR} = 45A, V_{GS} = 0V$	-	160	-	ns
Reverse Recovered Charge	$Q_{rr}$	$dI_{DR}/dt = 50A/\mu s$	-	0.2	-	$\mu C$

