

**100V, 20A Low $R_{DS(ON)}$
N ch Trench Power MOSFET
EKG1020, FKG1020**

Features

- V_{DS} ----- 100 V
- I_D ----- 20 A
- $R_{DS(ON)}$ ----- 33 m Ω typ. ($V_{GS} = 10$ V, $I_D = 10$ A)
- Built-in Gate protect diode
- 100 % UIL tested
- RoHS Compliant

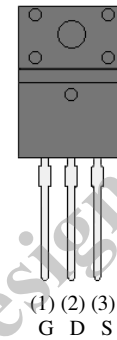
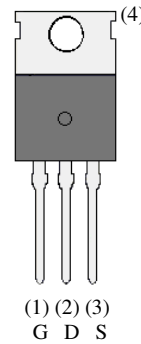
Applications

- Low Voltage DC Motor driver
- Solenoid driver

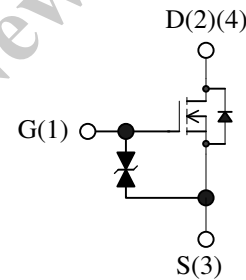
Package

EKG1020
TO220-3L

FKG1020
TO220F-3L



Not to scale



Absolute Maximum Ratings

- Unless otherwise specified, $T_A = 25$ °C

Characteristic	Symbol	Test conditions	Rating		Unit
			EKG1020	FKG1020	
Drain to Source Voltage	V_{DSS}		100		V
Gate to Source Voltage	V_{GSS}		± 20		V
Continuous Drain Current	$I_{D(DC)}$		20		A
Pulsed Drain Current	$I_{D(PULSE)}$	PW ≤ 100 μ s Duty cycle ≤ 1 %	60		A
Continuous Diode Forward Current	$I_{SD(DC)}$		20		A
Diode Pulse Current	$I_{SD(PULSE)}$	PW ≤ 100 μ s Duty cycle ≤ 1 %	60		A
Single Pulse Avalanche Energy	E_{AS}	$V_{DD} = 20$ V, $L = 200$ μ H, $I_{LP} = 20$ A, unclamped, $R_g = 50$ Ω , See Figure 1	50		mJ
Maximum avalanche current	I_{AS}		20		A
Maximum Power Dissipation	P_D	$T_C = 25$ °C	55	40	W
Thermal Resistance	θ_{j-c}		2.27	3.13	°C/W
	θ_{j-a}		62.5		°C/W
Operating Junction Temperature	T_j		150		°C
Storage Temperature	T_{stg}		- 55 to 150		°C

Electrical Characteristics

• Unless otherwise specified, $T_A = 25\text{ }^\circ\text{C}$

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 1\text{ mA}, V_{GS} = 0\text{ V}$	100	–	–	V
Drain to Source Breakdown Voltage Temp. Coefficient	$\Delta V_{(BR)DSS}$	$I_D = 1\text{ mA}, V_{GS} = 0\text{ V}$	–	80	–	mV/°C
Drain to Source Leakage Current	I_{DSS}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$	–	–	100	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20\text{ V}$	–	–	± 10	μA
Gate Threshold Voltage	V_{TH}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.5	2.0	2.5	V
Gate Threshold Voltage Temp. Coefficient	ΔV_{TH}	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	–	–6	–	mV/°C
Static Drain to Source On-Resistance	$R_{DS(ON)}$	$I_D = 10\text{ A}, V_{GS} = 10\text{ V}$	–	33	52	m Ω
		$I_D = 10\text{ A}, V_{GS} = 4.5\text{ V}$	–	36	59	
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 10\text{ A}$	9.0	–	–	S
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}$ $V_{GS} = 0\text{ V}$ $F = 1\text{ MHz}$	–	2200	–	pF
Output Capacitance	C_{oss}		–	210	–	
Reverse Transfer Capacitance	C_{rss}		–	110	–	
Total Gate Charge	Q_g	$V_{DD} = 50\text{ V}$ $I_D = 10\text{ A}, V_{GS} = 10\text{ V}$ $R_L = 5\text{ }\Omega$	–	45	–	nC
Gate to Source Charge	Q_{gs}		–	4	–	
Gate to Drain Charge	Q_{gd}		–	9	–	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 50\text{ V}$ $I_D = 10\text{ A}$ $R_L = 5\text{ }\Omega, R_g = 10\text{ }\Omega$ $V_{GS} = 10\text{ V}$, See Figure 3	–	15	–	ns
Rise Time	t_r		–	20	–	
Turn-Off Delay Time	$t_{d(off)}$		–	180	–	
Fall Time	t_f		–	90	–	
Source-Drain Diode Forward Voltage	V_{SD}	$I_{SD} = 20\text{ A}, V_{GS} = 0\text{ V}$	–	0.9	1.2	V
Source-Drain Diode Reverse Recovery Time	t_{rr}	$I_{SD} = 20\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ See Figure 2	–	50	–	ns
		$I_{SD} = 20\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $T_C = 150\text{ }^\circ\text{C}$ See Figure 2	–	60	–	ns
Source-Drain Diode Recovery Charge	Q_{rr}	$I_{SD} = 20\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ See Figure 2	–	90	–	nC
		$I_{SD} = 20\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $T_C = 150\text{ }^\circ\text{C}$ See Figure 2	–	120	–	nC

Test Circuits and Waveforms

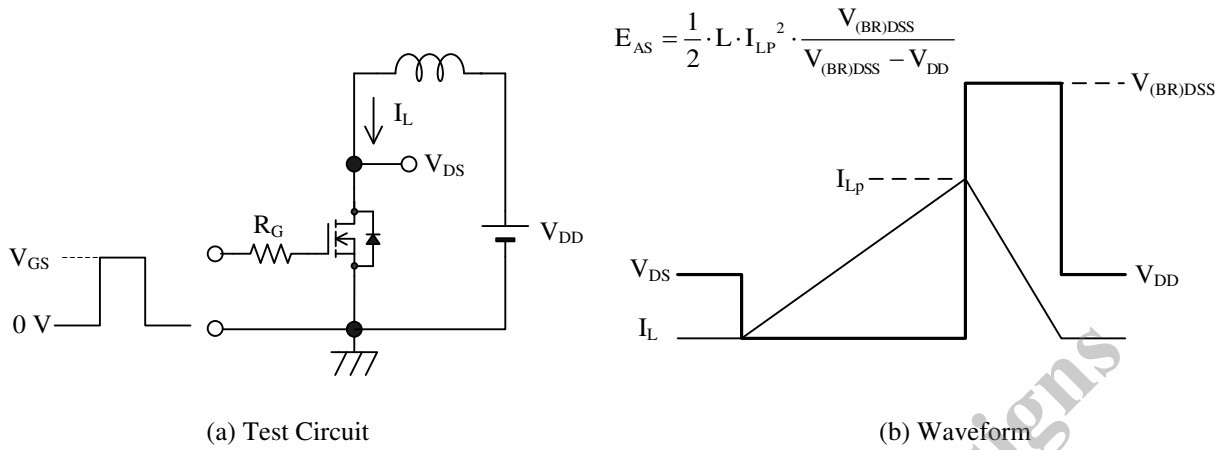


Figure 1. Unclamped Inductive

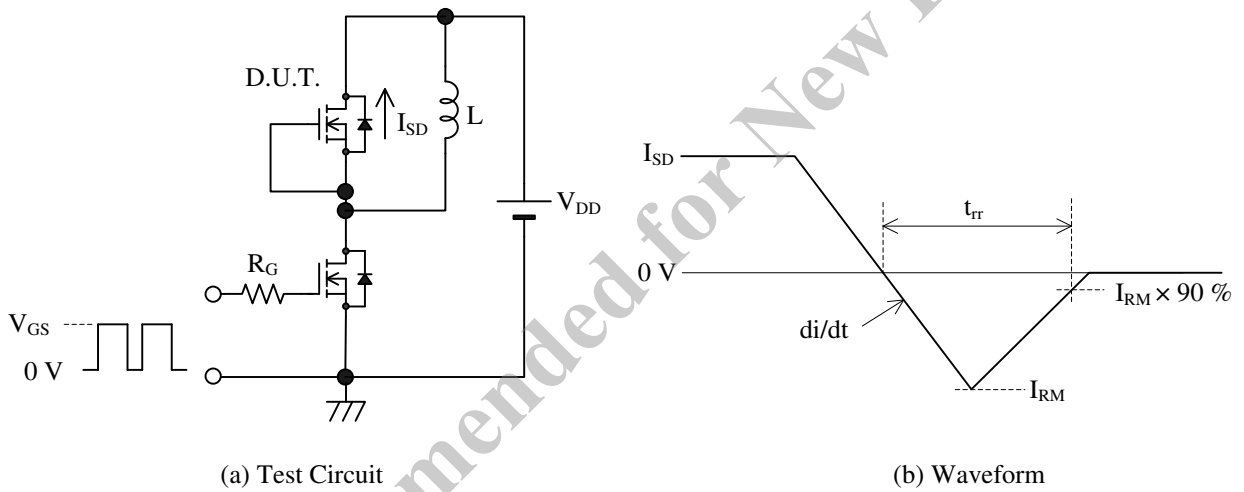


Figure 2. Diode Reverse Recovery Time

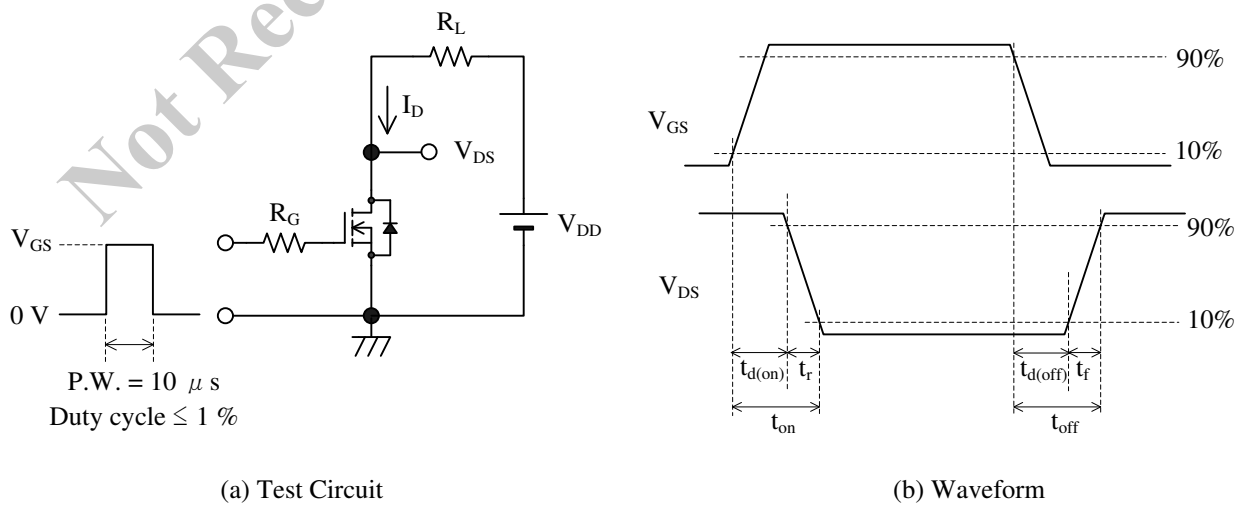
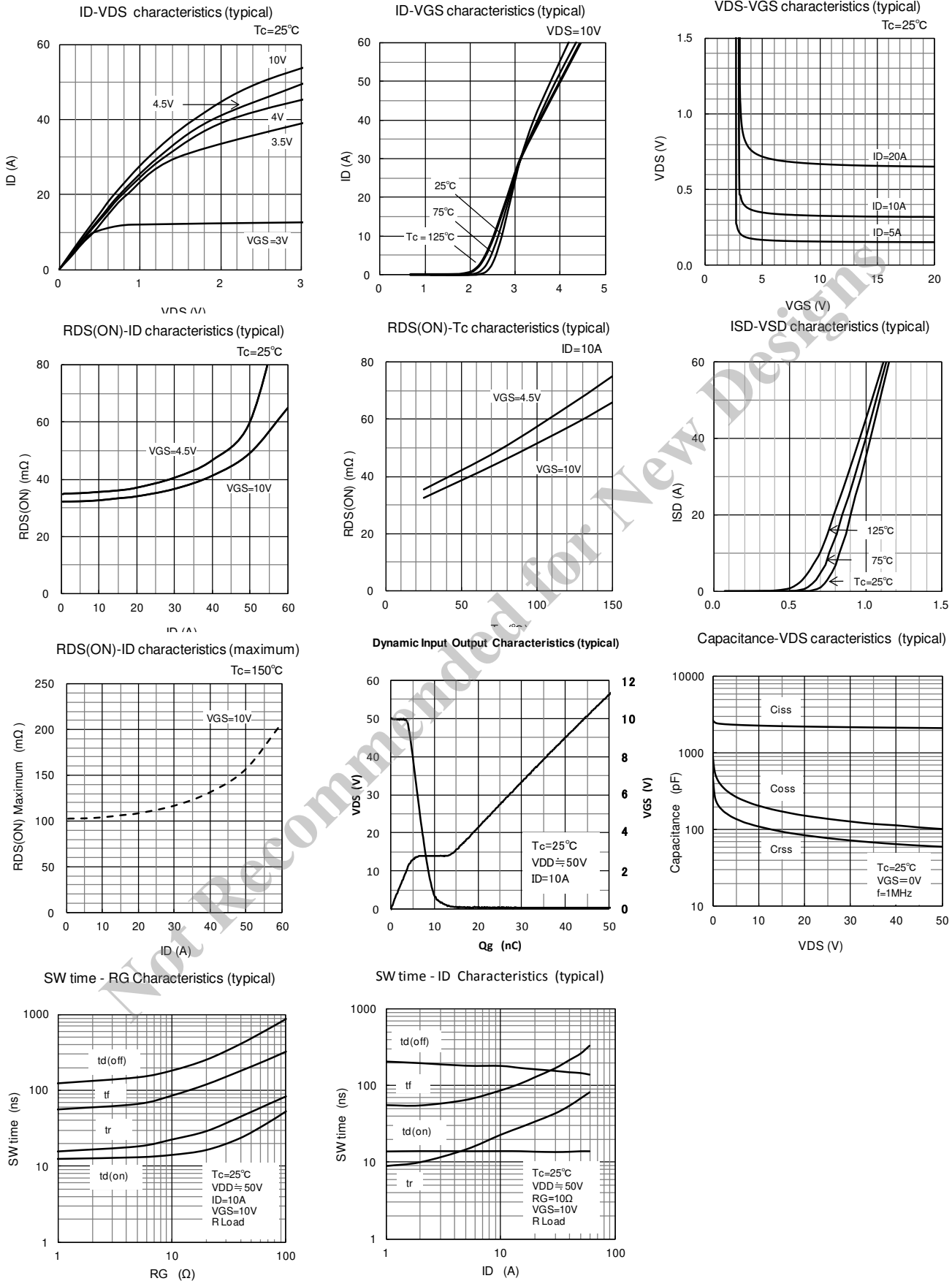


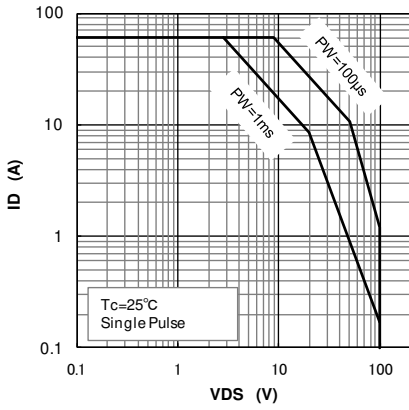
Figure 3. Switching Time

Performance Curves

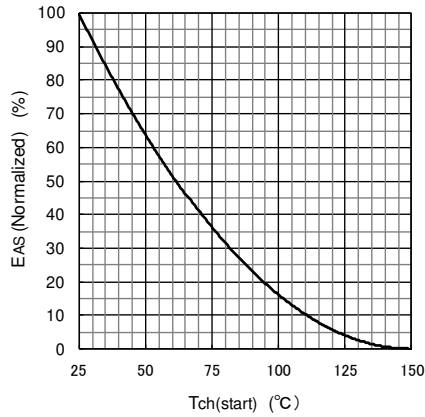


EKG1020, FKG1020

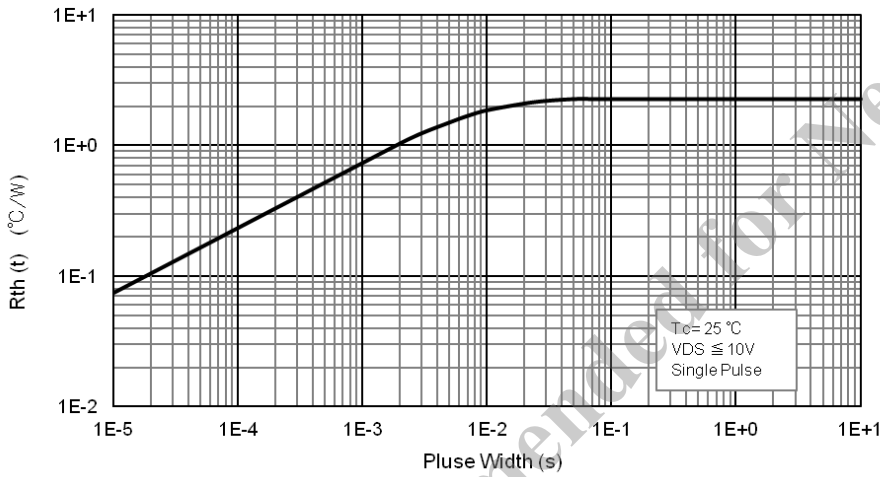
Safe Operating Area



EAS - Tc(start) Characteristics

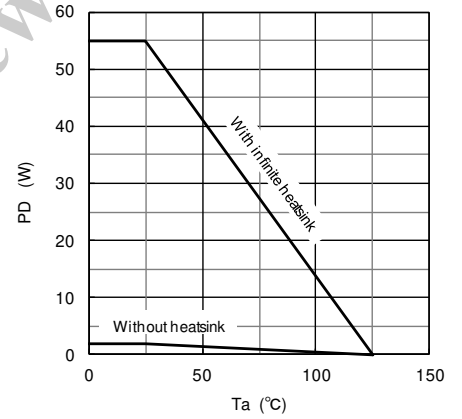


EKG1020 Transient Thermal Resistance - Pulse Width

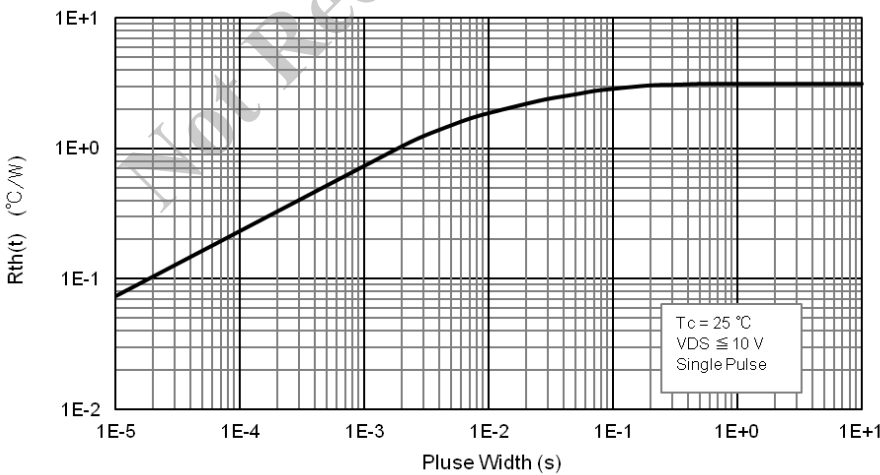


EKG1020

PD-Ta Characteristics

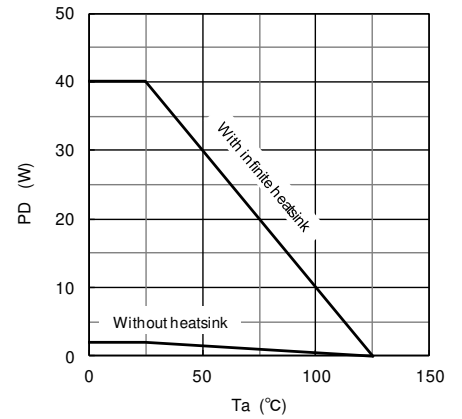


FKG1020 Transient Thermal Resistance - Pulse Width



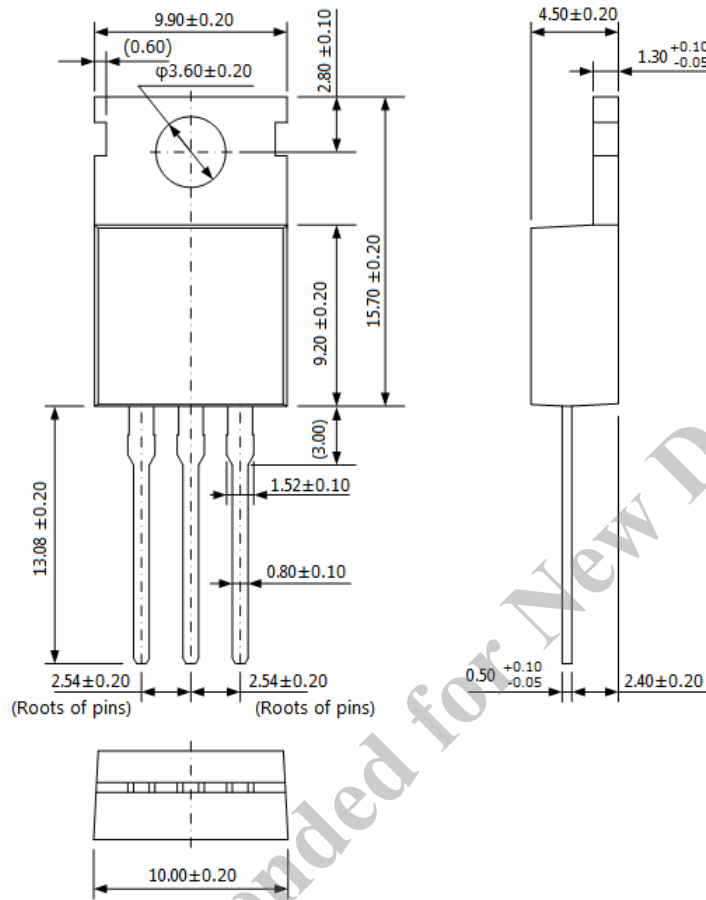
FKG1020

PD-Ta Characteristics



Physical Dimensions and Marking Diagram

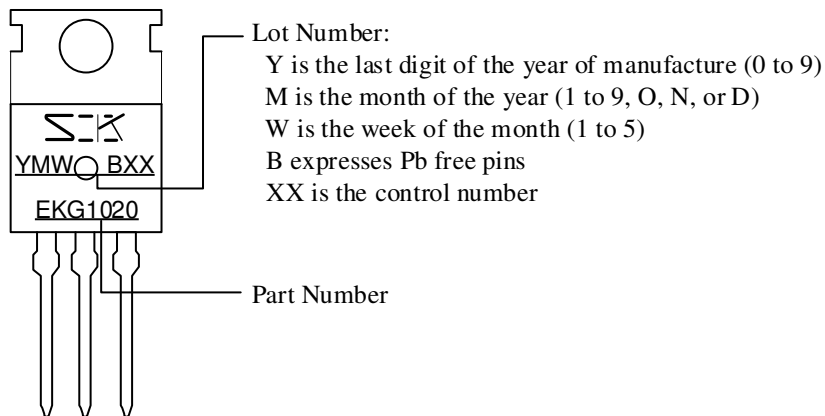
● EKG1020 Physical Dimensions
(TO220-3L)



NOTES:

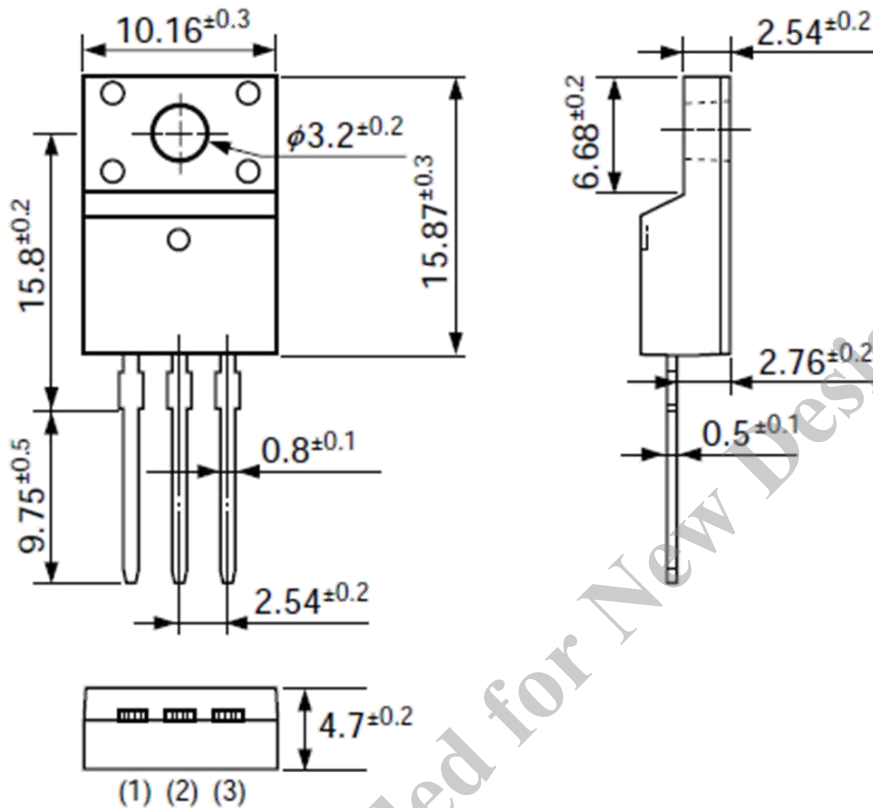
- Dimensions in millimeters
- Bare lead frame: Pb-free (RoHS compliant)
- When soldering the products, it is required to minimize the working time, within the following limits:
 - Flow: $260 \pm 5 \text{ }^\circ\text{C} / 10 \pm 1 \text{ s}$, 2 times
 - Soldering Iron: $380 \pm 10 \text{ }^\circ\text{C} / 3.5 \pm 0.5 \text{ s}$, 1 time
- Soldering should be at a distance of at least 1.5 mm from the body of the product.
- Recommended screw torque for TO220: 0.490 N·m to 0.686 N·m (5 kgf·cm to 7 kgf·cm)

● EKG1020 Marking Diagram



EKG1020, FKG1020

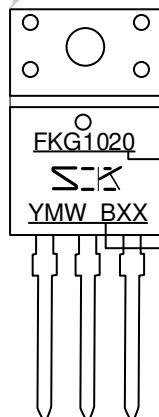
● FKG1020 Physical Dimensions (TO220F-3L)



NOTES:

- Dimensions in millimeters
- Bare lead frame: Pb-free (RoHS compliant)
- When soldering the products, it is required to minimize the working time, within the following limits:
 - Flow: $260 \pm 5 \text{ }^\circ\text{C} / 10 \pm 1 \text{ s}$, 2 times
 - Soldering Iron: $380 \pm 10 \text{ }^\circ\text{C} / 3.5 \pm 0.5 \text{ s}$, 1 time
- Soldering should be at a distance of at least 1.5 mm from the body of the product.
- Recommended screw torque for TO220: 0.490 N·m to 0.686 N·m (5 kgf·cm to 7 kgf·cm)

● FKG1020 Marking Diagram



Part Number

Lot Number:

Y is the last digit of the year of manufacture (0 to 9)

M is the month of the year (1 to 9, O, N, or D)

W is the week of the month (1 to 5)

B expresses Pb free pins

XX is the control number

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