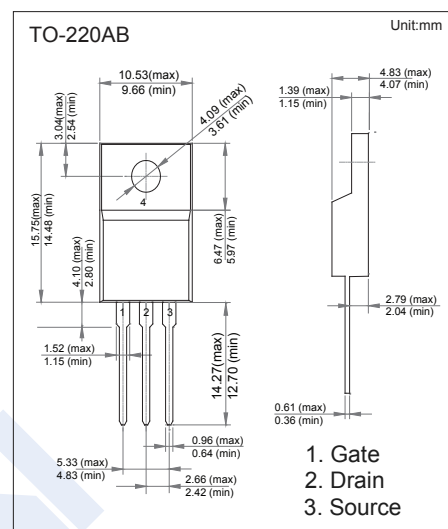
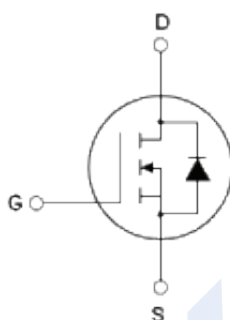


## N-Channel MOSFET

## KX20N65V

## ■ Features

- $V_{DS}(V) = 650V$
- $I_D = 21A$
- $R_{DS(ON)} < 180m\Omega$

■ Absolute Maximum Ratings ( $T_c = 25^\circ C$ )

| Parameter                                                            | Symbol     | Rating     | Unit          |
|----------------------------------------------------------------------|------------|------------|---------------|
| Drain-Source Voltage                                                 | $V_{DS}$   | 650        | V             |
| Gate-Source Voltage                                                  | $V_{GS}$   | $\pm 30$   | V             |
| Continuous Drain Current                                             | $I_D$      | 21         | A             |
|                                                                      |            | 13.2       |               |
| Pulsed Drain Current (Note 1)                                        | $I_{DM}$   | 84         | mJ            |
| Avalanche Current (Note 1)                                           | $I_{AR}$   | 10.5       |               |
| Single Pulse Avalanche Energy (Note 2)                               | $E_{AS}$   | 441        | mJ            |
| Repetitive Avalanche energy, $t_{AR}$ limited by $T_{jmax}$ (Note 1) | $E_{AR}$   | 0.7        |               |
| Drain Source voltage slope, $V_{DS} \leq 480 V$                      | $dv/dt$    | 50         | V/ns          |
| Reverse diode $dv/dt$ , $V_{DS} \leq 480 V, I_{SD} < I_D$            | $dv/dt$    | 15         |               |
| Power Dissipation ( $T_c = 25^\circ C$ )                             | $P_D$      | 188        | W             |
| Derate above $25^\circ C$                                            |            | 1.5        | W/ $^\circ C$ |
| Thermal Resistance, Junction- to-Case                                | $R_{thJC}$ | 0.66       | $^\circ C/W$  |
| Thermal Resistance, Junction- to-Ambient                             | $R_{thJA}$ | 62.5       |               |
| Junction Temperature                                                 | $T_J$      | 150        | $^\circ C$    |
| Storage Temperature Range                                            | $T_{stg}$  | -55 to 150 |               |

Notes: 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2.  $T_J = 25^\circ C, V_{DD} = 50V, V_G = 10V, R_G = 25\Omega$

## N-Channel MOSFET

## KX20N65V

■ Electrical Characteristics ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

| Parameter                         | Symbol       | Test Conditions                                                               | Min | Typ  | Max       | Unit          |
|-----------------------------------|--------------|-------------------------------------------------------------------------------|-----|------|-----------|---------------|
| Drain-Source Breakdown Voltage    | $V_{DS}$     | $I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$                                     | 650 |      |           | V             |
| Zero Gate Voltage Drain Current   | $I_{DSS}$    | $V_{DS}=650\text{V}$ , $V_{GS}=0\text{V}$ , $T_C=25^\circ\text{C}$            |     |      | 1         | $\mu\text{A}$ |
|                                   |              | $V_{DS}=650\text{V}$ , $V_{GS}=0\text{V}$ , $T_C=125^\circ\text{C}$           |     |      | 100       |               |
| Gate-Body Leakage Current         | $I_{GSS}$    | $V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$                                  |     |      | $\pm 100$ | nA            |
| Gate Threshold Voltage            | $V_{GS(th)}$ | $V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$                                        | 3   |      | 4         | V             |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=10\text{V}$ , $I_D=10.5\text{A}$                                      |     |      | 180       | m $\Omega$    |
| Forward Transconductance          | $g_{FS}$     | $V_{DS}=20\text{V}$ , $I_D=10.5\text{A}$                                      |     | 16   |           | S             |
| Input Capacitance                 | $C_{iss}$    | $V_{GS}=0\text{V}$ , $V_{DS}=50\text{V}$ , $f=1\text{MHz}$                    |     | 2250 |           | pF            |
| Output Capacitance                | $C_{oss}$    |                                                                               |     | 83   |           |               |
| Reverse Transfer Capacitance      | $C_{rss}$    |                                                                               |     | 1.6  |           |               |
| Total Gate Charge                 | $Q_g$        | $V_{DS}=480\text{V}$ , $I_D=21\text{A}$ , $V_{GS}=10\text{V}$                 |     | 36   |           | nC            |
| Gate Source Charge                | $Q_{gs}$     |                                                                               |     | 14   |           |               |
| Gate Drain Charge                 | $Q_{gd}$     |                                                                               |     | 8.5  |           |               |
| Turn-On DelayTime                 | $t_{d(on)}$  | $V_{DS}=380\text{V}$ , $I_D=11\text{A}$ , $V_{GS}=10\text{V}$ , $R_G=4\Omega$ |     | 11   |           | ns            |
| Turn-On Rise Time                 | $t_r$        |                                                                               |     | 6    |           |               |
| Turn-Off DelayTime                | $t_{d(off)}$ |                                                                               |     | 61   |           |               |
| Turn-Off Fall Time                | $t_f$        |                                                                               |     | 4.5  |           |               |
| Body-Diode Continuous Current     | $I_S$        | $T_C=25^\circ\text{C}$                                                        |     |      | 21        | A             |
| Body-Diode Pulsed Current         | $I_{SM}$     |                                                                               |     |      | 84        |               |
| Diode Forward Voltage (Note 1)    | $V_{SD}$     | $T_J=25^\circ\text{C}$ , $I_{SD}=21\text{A}$ , $V_{GS}=0\text{V}$             |     |      | 1.3       | V             |
| Reverse Recovery Time (Note 1)    | $t_{rr}$     | $T_J=25^\circ\text{C}$ , $I_F=21\text{A}$ , $di/dt=100\text{A}/\mu\text{s}$   |     | 310  |           | nS            |
| Reverse Recovery Charge (Note 1)  | $Q_{rr}$     |                                                                               |     | 5    |           | nC            |
| Peak Reverse Recovery Current     | $I_{rrm}$    |                                                                               |     | 28   |           | A             |

## N-Channel MOSFET

## KX20N65V

## ■ Typical Electrical And Thermal Characteristics

Figure1. Safe operating area

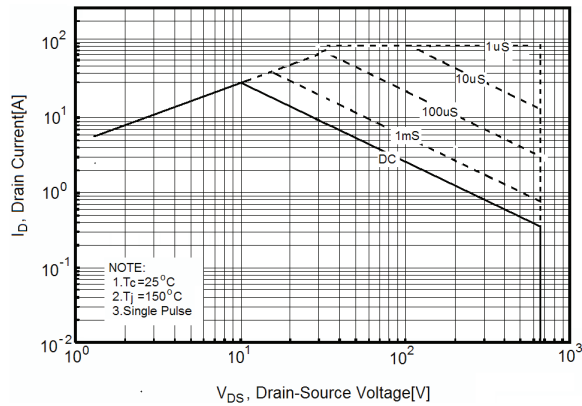


Figure 2. Capacitance

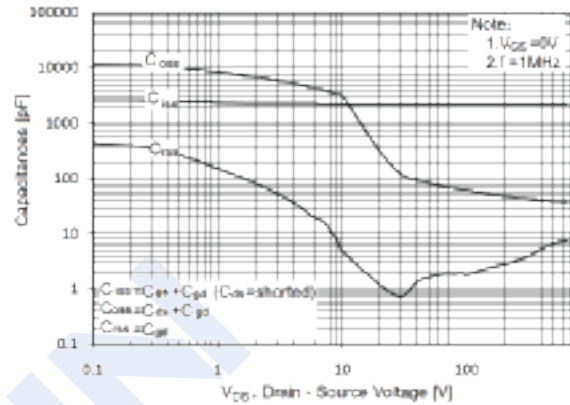


Figure 3. Source-Drain Diode Forward Voltage

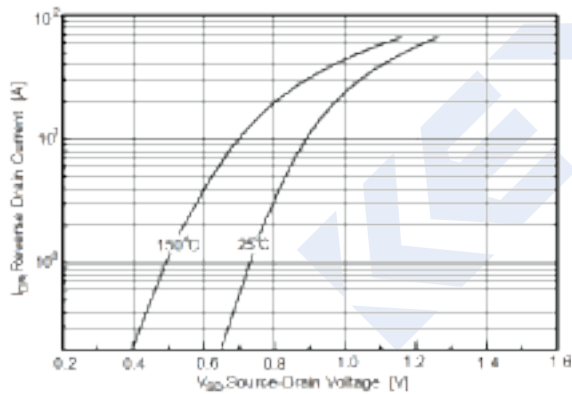


Figure 4. Output characteristics

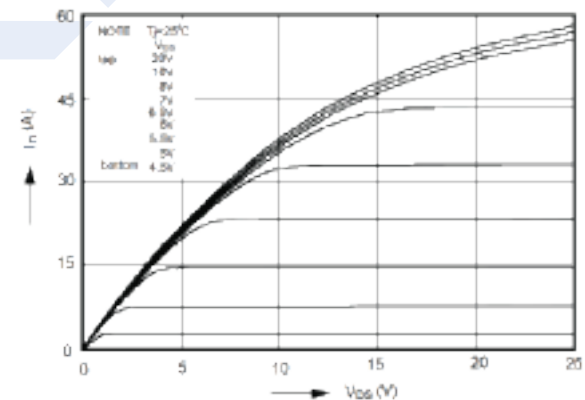


Figure 5. Transfer characteristics

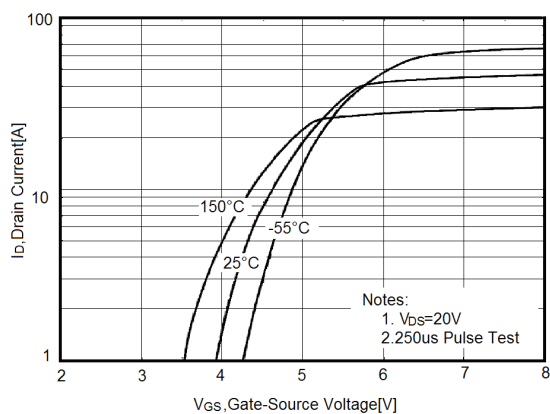
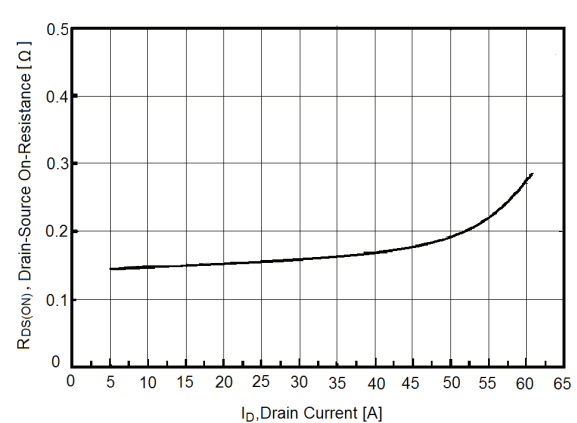


Figure 6. Static drain-source on resistance



## N-Channel MOSFET

## KX20N65V

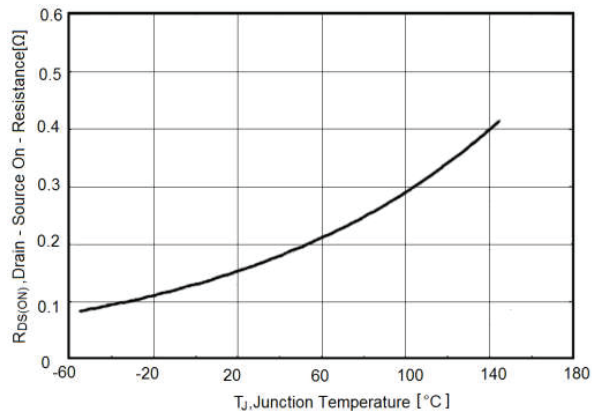
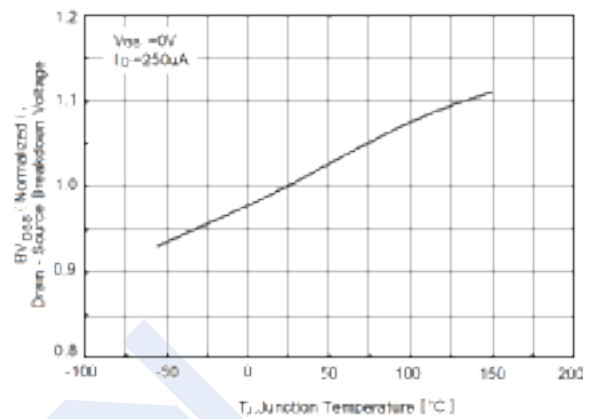
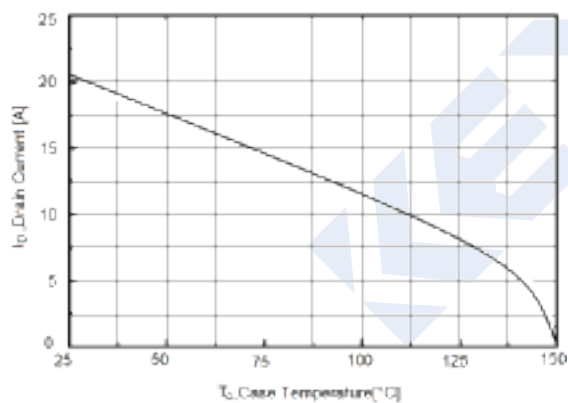
Figure 7.  $R_{DS(ON)}$  vs Junction TemperatureFigure 8.  $BV_{DSS}$  vs Junction TemperatureFigure 9. Maximum  $I_D$  vs Junction Temperature

Figure 10. Transient Thermal Impedance

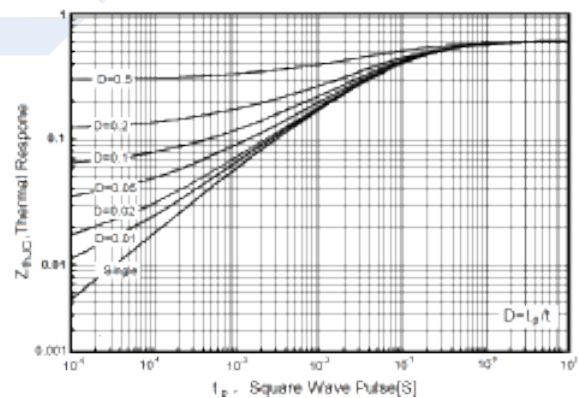
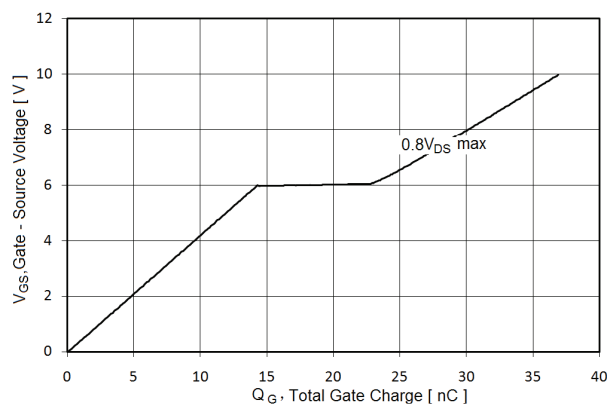


Figure 11. Gate charge waveforms

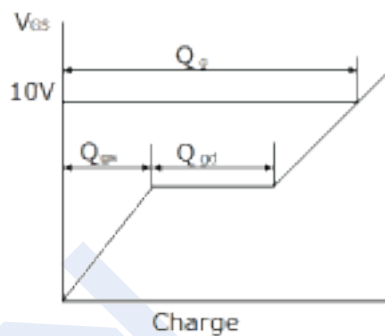
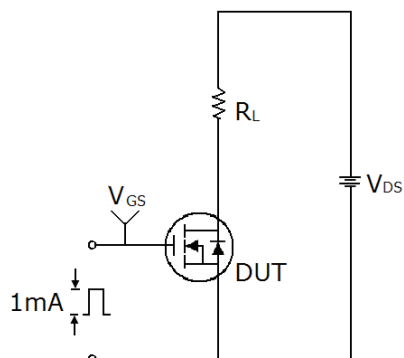


## N-Channel MOSFET

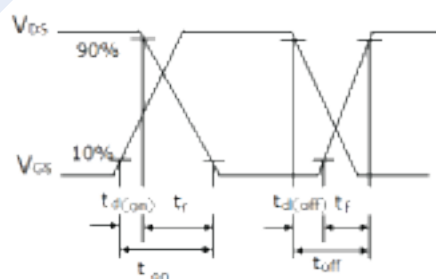
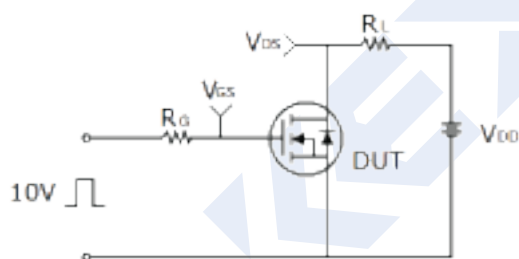
## KX20N65V

## ■ Test Circuit

## 1) Gate charge test circuit &amp; Waveform



## 2) Switch Time Test Circuit:



## 3) Unclamped Inductive Switching Test Circuit &amp; Waveforms

