

## Features

- 40V/61A,  
 $R_{DS(ON)} = 4.3m\Omega(Typ.)@V_{GS}=10V$   
 $R_{DS(ON)} = 6.2m\Omega(Typ.)@V_{GS}=4.5V$
- Excellent  $Q_G \times R_{DS(on)}$  product(FOM)
- SGT Technology
- Fast Switching Speed
- 100% avalanche tested

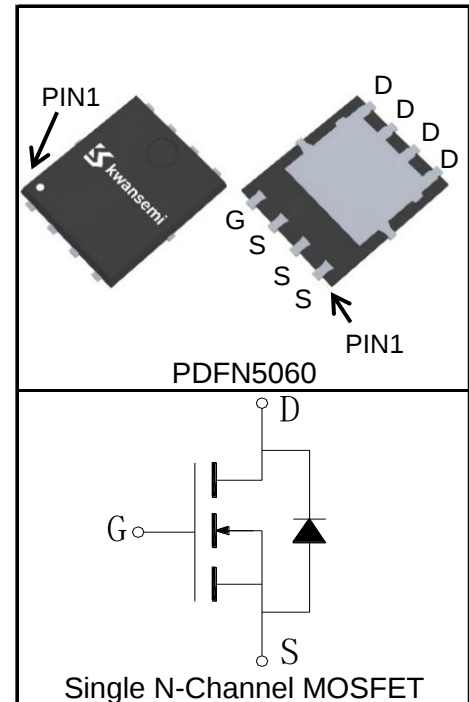
## Applications

- Switching Application Systems
- Synchronous Rectification
- DC/DC Converter



Halogen-Free

## Pin Description



## Absolute Maximum Ratings

| Symbol                                                                 | Parameter                                       | Rating                        | Unit             |
|------------------------------------------------------------------------|-------------------------------------------------|-------------------------------|------------------|
| <b>Common Ratings</b> ( $T_C=25^\circ\text{C}$ Unless Otherwise Noted) |                                                 |                               |                  |
| $V_{DSS}$                                                              | Drain-Source Voltage                            | 40                            | V                |
| $V_{GSS}$                                                              | Gate-Source Voltage                             | $\pm 20$                      | V                |
| $T_{Jmax}$                                                             | Maximum Junction Temperature                    | 150                           | $^\circ\text{C}$ |
| $T_J, T_{STG}$                                                         | Operating and Storage Temperature Range         | -55 to 150                    | $^\circ\text{C}$ |
| $I_S$                                                                  | Diode Continuous Forward Current                | $T_C=25^\circ\text{C}$<br>61  | A                |
| <b>Mounted on Large Heat Sink</b>                                      |                                                 |                               |                  |
| $I_{DP}^{①}$                                                           | Pulse Drain Current                             | $T_C=25^\circ\text{C}$<br>244 | A                |
| $I_D^{②}$                                                              | Continuous Drain Current@ $T_C(V_{GS}=10V)$     | $T_C=25^\circ\text{C}$<br>61  | A                |
|                                                                        |                                                 | $T_C=100^\circ\text{C}$<br>38 |                  |
|                                                                        | Continuous Drain Current@ $T_A(V_{GS}=10V)^{③}$ | $T_A=25^\circ\text{C}$<br>22  |                  |
|                                                                        |                                                 | $T_A=70^\circ\text{C}$<br>17  |                  |
| $P_D$                                                                  | Maximum Power Dissipation@ $T_C$                | $T_C=25^\circ\text{C}$<br>32  | W                |
|                                                                        |                                                 | $T_C=100^\circ\text{C}$<br>13 |                  |
|                                                                        | Maximum Power Dissipation@ $T_A^{③}$            | $T_A=25^\circ\text{C}$<br>4.2 |                  |
|                                                                        |                                                 | $T_A=70^\circ\text{C}$<br>2.7 |                  |

| Symbol                                | Parameter                              | Rating | Unit |
|---------------------------------------|----------------------------------------|--------|------|
| $R_{\theta JC}$                       | Thermal Resistance-Junction to Case    | 3.85   | °C/W |
| $R_{\theta JA}^{③}$                   | Thermal Resistance-Junction to Ambient | 30     | °C/W |
| <b>Drain-Source Avalanche Ratings</b> |                                        |        |      |
| $E_{AS}^{④}$                          | Avalanche Energy, Single Pulsed        | 90     | mJ   |

**Electrical Characteristics** ( $T_C=25^{\circ}\text{C}$  Unless Otherwise Noted)

| Symbol                        | Parameter                        | Test Condition                                                                         | KS4214NAT             |      |      | Unit |
|-------------------------------|----------------------------------|----------------------------------------------------------------------------------------|-----------------------|------|------|------|
|                               |                                  |                                                                                        | Min.                  | Typ. | Max. |      |
| Static Characteristics        |                                  |                                                                                        |                       |      |      |      |
| BV <sub>DSS</sub>             | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA                                            | 40                    |      |      | V    |
| I <sub>DSS</sub>              | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =40V, V <sub>GS</sub> =0V                                              |                       |      | 1    | μA   |
|                               |                                  |                                                                                        | T <sub>J</sub> =125°C |      | 30   |      |
| V <sub>GS(th)</sub>           | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA                              | 1.1                   | 1.6  | 2.3  | V    |
| I <sub>GSS</sub>              | Gate Leakage Current             | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                             |                       |      | ±100 | nA   |
| R <sub>DS(ON)</sub> ⑤         | Drain-Source On-state Resistance | V <sub>GS</sub> =10V, I <sub>DS</sub> =20A                                             |                       | 4.3  | 5.2  | mΩ   |
|                               |                                  | V <sub>GS</sub> =4.5V, I <sub>DS</sub> =15A                                            |                       | 6.2  | 8    | mΩ   |
| Diode Characteristics         |                                  |                                                                                        |                       |      |      |      |
| V <sub>SD</sub> ⑤             | Diode Forward Voltage            | I <sub>SD</sub> =20A, V <sub>GS</sub> =0V                                              |                       | 0.84 | 1.2  | V    |
| t <sub>rr</sub>               | Reverse Recovery Time            | I <sub>SD</sub> =20A, dI <sub>SD</sub> /dt=100A/μs                                     |                       | 15   |      | ns   |
| Q <sub>rr</sub>               | Reverse Recovery Charge          |                                                                                        |                       | 27   |      | nC   |
| Dynamic Characteristics ⑥     |                                  |                                                                                        |                       |      |      |      |
| R <sub>G</sub>                | Gate Resistance                  | V <sub>GS</sub> =0V,V <sub>DS</sub> =0V,F=1MHz                                         |                       | 5    |      | Ω    |
| C <sub>iss</sub>              | Input Capacitance                | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =20V,<br>Frequency=1.0MHz                      |                       | 930  |      | pF   |
| C <sub>oss</sub>              | Output Capacitance               |                                                                                        |                       | 480  |      |      |
| C <sub>rss</sub>              | Reverse Transfer Capacitance     |                                                                                        |                       | 15   |      |      |
| t <sub>d(ON)</sub>            | Turn-on Delay Time               | V <sub>DD</sub> =20V, I <sub>DS</sub> =20A,<br>V <sub>GS</sub> =10V,R <sub>G</sub> =3Ω |                       | 8    |      | ns   |
| t <sub>r</sub>                | Turn-on Rise Time                |                                                                                        |                       | 14   |      |      |
| t <sub>d(OFF)</sub>           | Turn-off Delay Time              |                                                                                        |                       | 21   |      |      |
| t <sub>f</sub>                | Turn-off Fall Time               |                                                                                        |                       | 9    |      |      |
| Gate Charge Characteristics ⑥ |                                  |                                                                                        |                       |      |      |      |
| Q <sub>g</sub>                | Total Gate Charge                | V <sub>DS</sub> =20V, V <sub>GS</sub> =10V,<br>I <sub>DS</sub> =20A                    |                       | 18   |      | nC   |
| Q <sub>gs</sub>               | Gate-Source Charge               |                                                                                        |                       | 2.8  |      |      |
| Q <sub>gd</sub>               | Gate-Drain Charge                |                                                                                        |                       | 4.2  |      |      |

**Notes:**

- ①Pulse width limited by safe operating area.
- ②Calculated continuous current based on maximum allowable junction temperature. The package limitation current is 50A.
- ③When mounted on 1 inch square copper board,  $t \leq 10\text{sec}$ .
- ④Limited by  $T_{j\text{max}}$ , Starting  $T_j = 25^\circ\text{C}$ ,  $I_{AS\text{max}} = 19\text{A}$ ,  $L = 0.5\text{mH}$ ,  $V_{DD} = 24\text{V}$ ,  $R_G = 25\Omega$ ,  $V_{GS} = 10\text{V}$ . Part not recommended for use above this value. 100% Final Test at  $I_{AS} = 10\text{A}$ ,  $L = 0.5\text{mH}$ .
- ⑤Pulse test; Pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- ⑥Guaranteed by design, not subject to production testing.

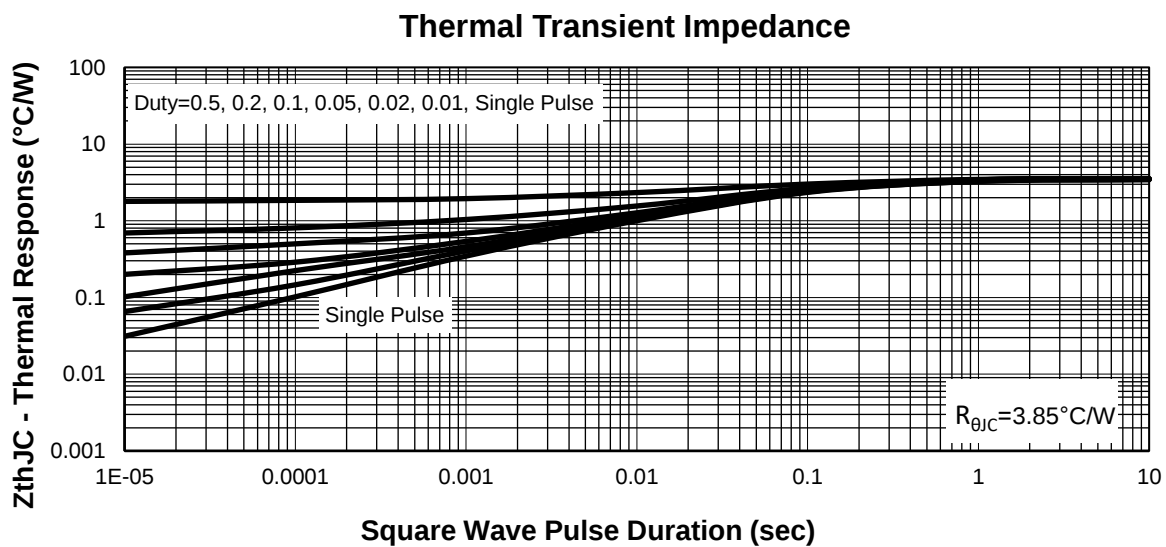
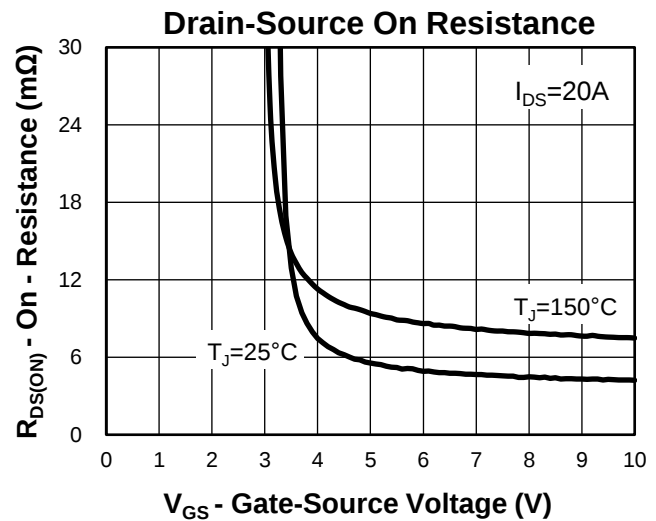
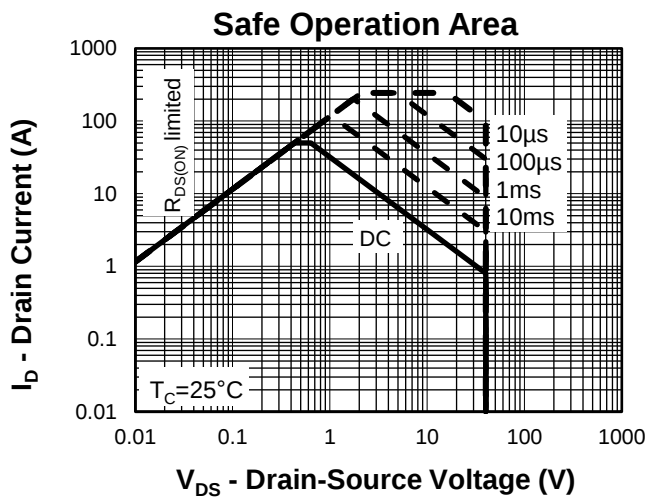
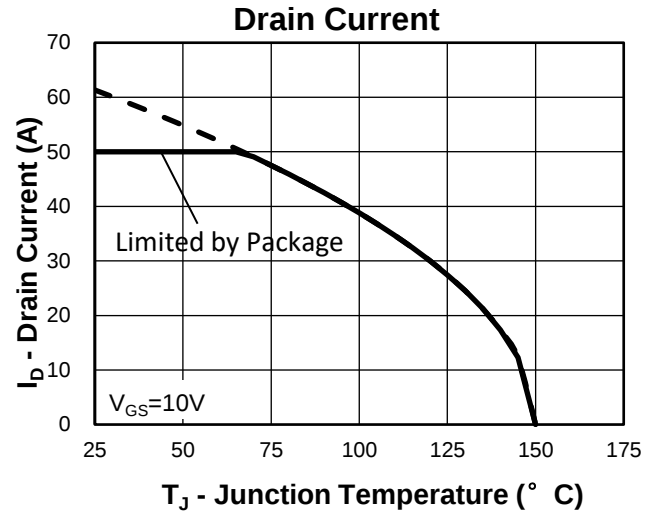
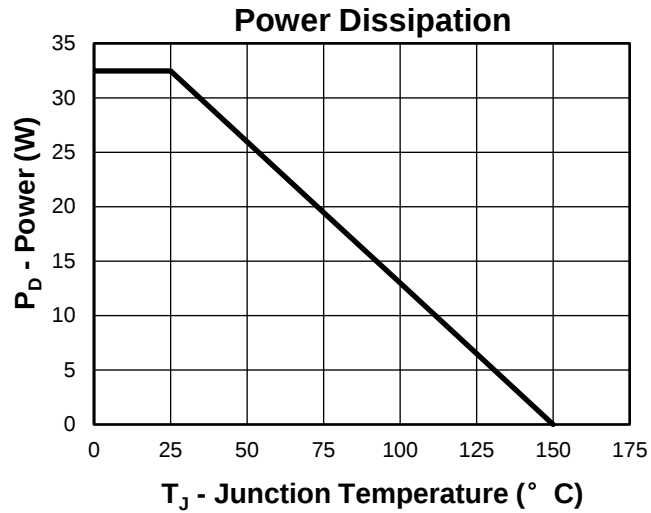
**Ordering and Marking Information**

| Device    | Package  | Packaging | Quantity | Reel Size | Tape width |
|-----------|----------|-----------|----------|-----------|------------|
| KS4214NAT | PDFN5060 | Tape&Reel | 5000     | 13"       | 12mm       |

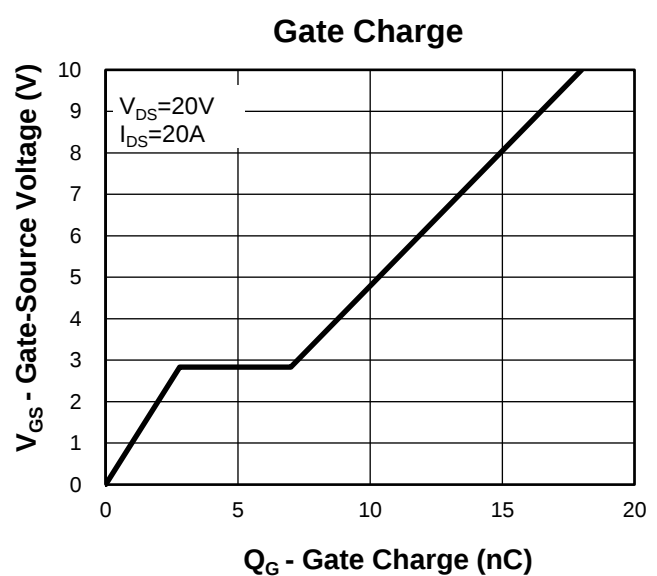
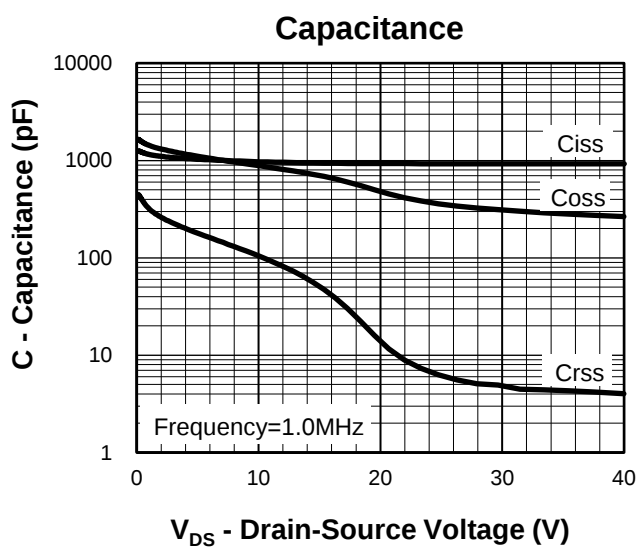
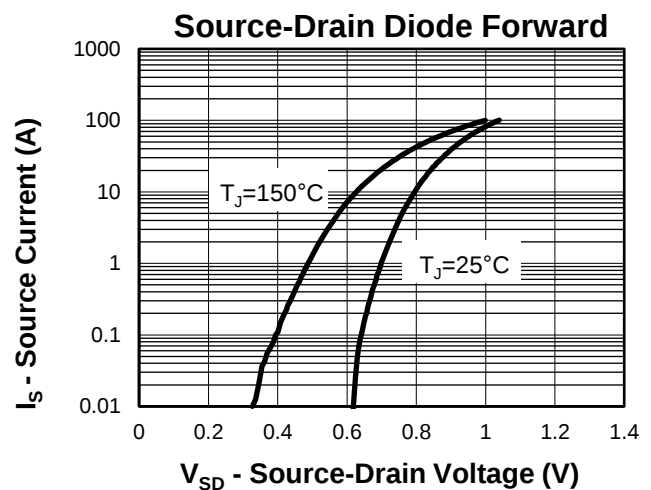
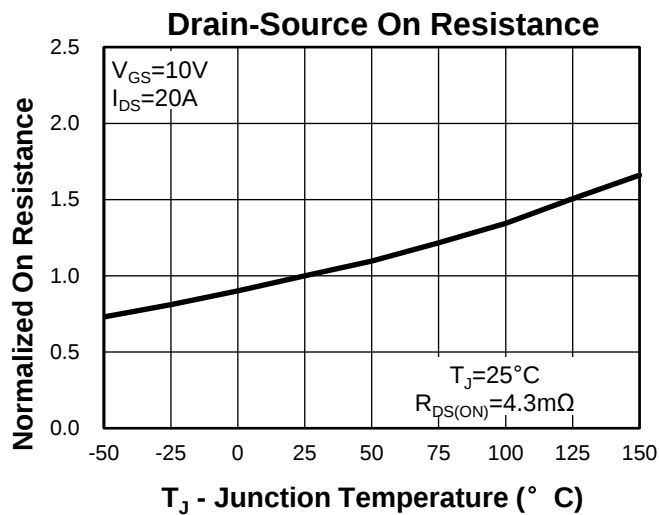
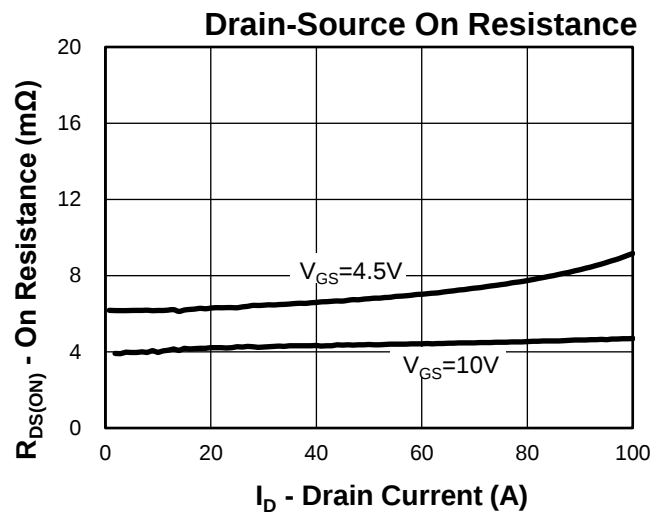
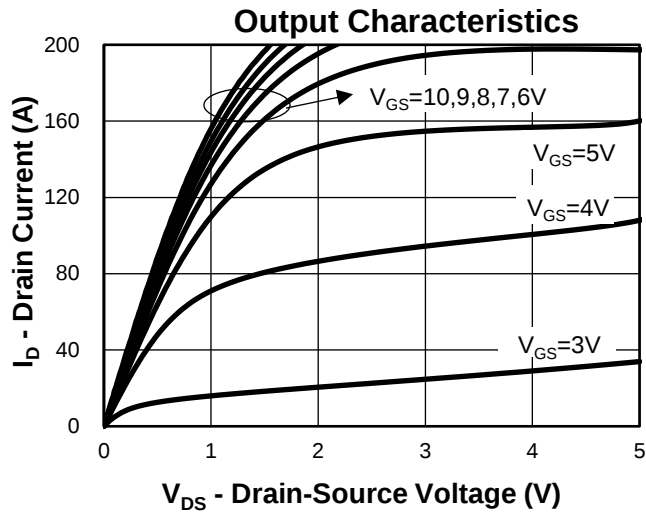


1st Line: Kwansemi LOGO, Kwansemi Code(KS)  
 2nd Line: Part Number(4214T)  
 3rd Line: Lot Number(YWWXXX)

## Typical Characteristics

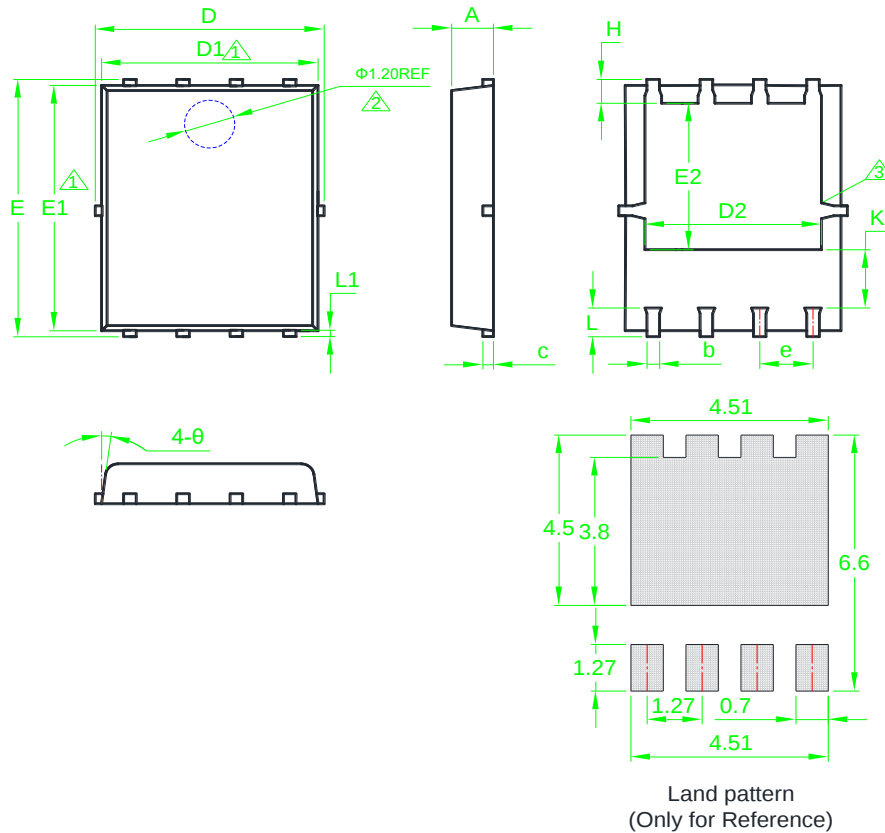


## Typical Characteristics



## Package Information

### PDFN5060



| SYMBOL | MM      |      |      | INCH     |       |       | SYMBOL | MM      |      |      | INCH     |       |       |
|--------|---------|------|------|----------|-------|-------|--------|---------|------|------|----------|-------|-------|
|        | MIN     | NOM  | MAX  | MIN      | NOM   | MAX   |        | MIN     | NOM  | MAX  | MIN      | NOM   | MAX   |
| A      | 0.90    | 1.00 | 1.20 | 0.035    | 0.039 | 0.047 | E2     | 3.27    | 3.50 | 3.90 | 0.129    | 0.138 | 0.154 |
| b      | 0.25    | *    | 0.50 | 0.010    | *     | 0.020 | e      | 1.27BSC |      |      | 0.050BSC |       |       |
| c      | 0.20    | 0.25 | 0.30 | 0.008    | 0.010 | 0.012 | H      | 0.41    | 0.51 | 0.71 | 0.016    | 0.020 | 0.028 |
| D      | 5.15BSC |      |      | 0.203BSC |       |       | K      | 1.10    | 1.35 | 1.50 | 0.043    | 0.053 | 0.059 |
| D1     | 4.80    | 5.00 | 5.40 | 0.189    | 0.197 | 0.213 | L      | 0.51    | 0.61 | 0.71 | 0.020    | 0.024 | 0.028 |
| D2     | 3.60    | *    | 4.40 | 0.142    | *     | 0.173 | L1     | 0.06    | 0.13 | 0.30 | 0.002    | 0.005 | 0.012 |
| E      | 5.90    | 6.15 | 6.30 | 0.232    | 0.242 | 0.248 | θ      | 0°      | *    | 12°  | 0°       | *     | 12°   |
| E1     | 5.40    | 5.80 | 5.95 | 0.213    | 0.228 | 0.234 |        |         |      |      |          |       |       |

- △1 Dimensions D1 and E1 do not include mold flash protrusions or gate burrs.
- △2 The existence and size of demolding hole are variable depending on mold.
- △3 The size and shape of exposed pad are variable depending on mold.

### Avalanche Test Circuit and Waveforms



### Switching Time Test Circuit and Waveforms



### Diode Recovery Test Circuit and Waveforms



### Gate Charge Test Circuit and Waveform



### Customer Service

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