

## Features

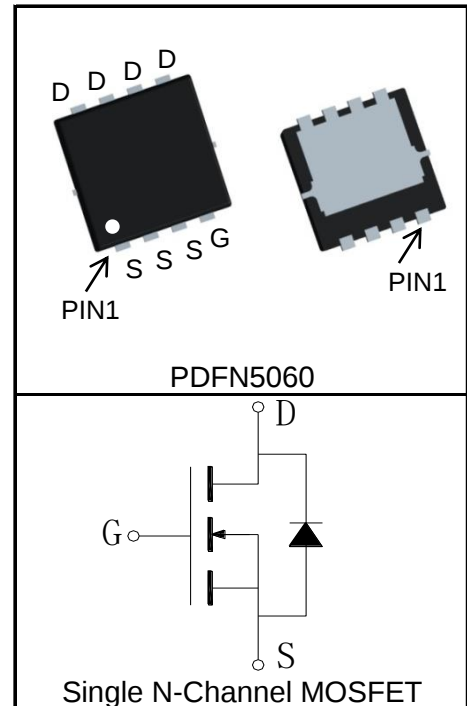
- 30V/70A,  
 $R_{DS(ON)} = 3.5m\Omega(Typ.)@V_{GS}=10V$   
 $R_{DS(ON)} = 6m\Omega(Typ.)@V_{GS}=4.5V$
- Low  $R_{DS(ON)}$
- Super High Dense Cell Design
- Fast Switching Speed
- 100% avalanche tested

## Applications

- Switching Application Systems



## 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                              | 30                            | V                |
| $V_{GSS}$                                                              | Gate-Source Voltage                               | $\pm 20$                      |                  |
| $T_J$                                                                  | Maximum Junction Temperature                      | 150                           | $^\circ\text{C}$ |
| $T_{STG}$                                                              | Storage Temperature Range                         | -55 to 150                    | $^\circ\text{C}$ |
| $I_S$                                                                  | Diode Continuous Forward Current                  | $T_C=25^\circ\text{C}$<br>70  | A                |
| <b>Mounted on Large Heat Sink</b>                                      |                                                   |                               |                  |
| $I_{DP}^{(1)}$                                                         | 300 $\mu\text{s}$ Pulse Drain Current Tested      | $T_C=25^\circ\text{C}$<br>280 | A                |
| $I_D^{(2)}$                                                            | Continuous Drain Current@ $T_C(V_{GS}=10V)$       | $T_C=25^\circ\text{C}$<br>70  | A                |
|                                                                        |                                                   | $T_C=100^\circ\text{C}$<br>44 |                  |
|                                                                        | Continuous Drain Current@ $T_A(V_{GS}=10V)^{(3)}$ | $T_A=25^\circ\text{C}$<br>20  |                  |
|                                                                        |                                                   | $T_A=70^\circ\text{C}$<br>16  |                  |
| $P_D$                                                                  | Maximum Power Dissipation@ $T_C$                  | $T_C=25^\circ\text{C}$<br>37  | W                |
|                                                                        |                                                   | $T_C=100^\circ\text{C}$<br>15 |                  |
|                                                                        | 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    | 3.4    | $^{\circ}\text{C/W}$ |
| $R_{\theta JA}^{(3)}$                 | Thermal Resistance-Junction to Ambient | 30     | $^{\circ}\text{C/W}$ |
| <b>Drain-Source Avalanche Ratings</b> |                                        |        |                      |
| $E_{AS}^{(4)}$                        | Avalanche Energy, Single Pulsed        | 49     | mJ                   |

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

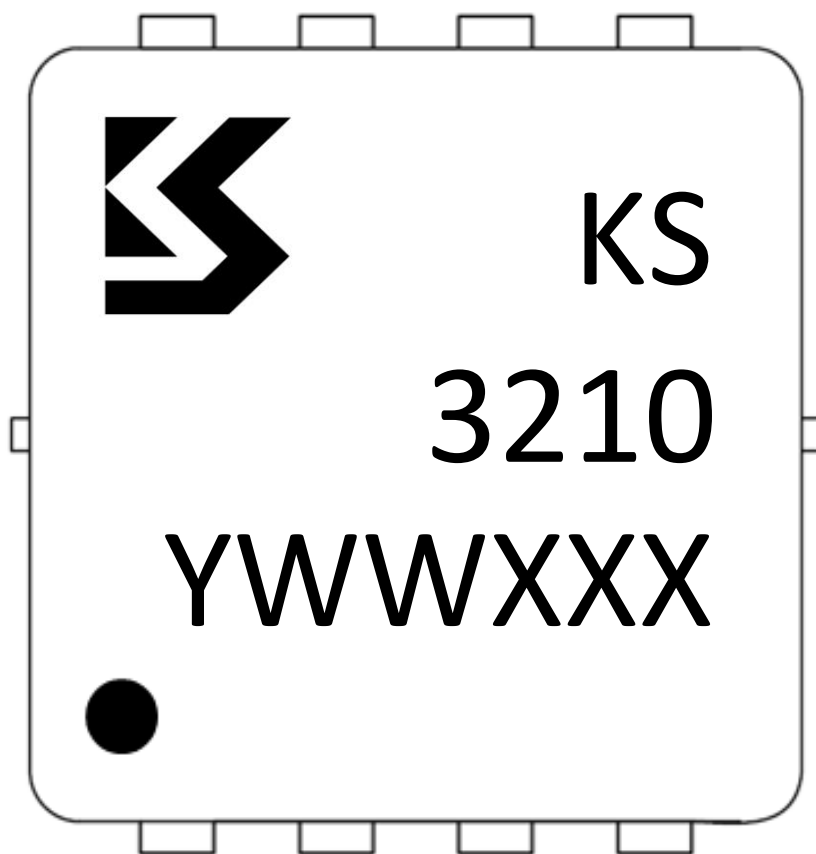
| Symbol                        | Parameter                        | Test Condition                                                                       | KS3210ND |      |      | Unit |
|-------------------------------|----------------------------------|--------------------------------------------------------------------------------------|----------|------|------|------|
|                               |                                  |                                                                                      | Min.     | Typ. | Max. |      |
| Static Characteristics        |                                  |                                                                                      |          |      |      |      |
| BV <sub>DSS</sub>             | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA                                          | 30       |      |      | V    |
| I <sub>DSS</sub>              | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =30V, 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                                           |          | 3.5  | 5    | mΩ   |
|                               |                                  | V <sub>GS</sub> =4.5V, I <sub>DS</sub> =15A                                          |          | 6    | 8    | mΩ   |
| Diode Characteristics         |                                  |                                                                                      |          |      |      |      |
| V <sub>SD</sub> ⑤             | Diode Forward Voltage            | I <sub>SD</sub> =20A, V <sub>GS</sub> =0V                                            |          | 0.87 | 1.2  | V    |
| t <sub>rr</sub>               | Reverse Recovery Time            | I <sub>SD</sub> =20A, dI <sub>SD</sub> /dt=100A/μs                                   |          | 16   |      | ns   |
| Q <sub>rr</sub>               | Reverse Recovery Charge          |                                                                                      |          | 42   |      | nC   |
| Dynamic Characteristics ⑥     |                                  |                                                                                      |          |      |      |      |
| R <sub>G</sub>                | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                     |          | 0.85 |      | Ω    |
| C <sub>iss</sub>              | Input Capacitance                | V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, Frequency=1.0MHz                          |          | 1930 |      | pF   |
| C <sub>oss</sub>              | Output Capacitance               |                                                                                      |          | 310  |      |      |
| C <sub>rss</sub>              | Reverse Transfer Capacitance     |                                                                                      |          | 260  |      |      |
| t <sub>d(ON)</sub>            | Turn-on Delay Time               | V <sub>DD</sub> =15V, I <sub>DS</sub> =20A, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω |          | 8    |      | ns   |
| t <sub>r</sub>                | Turn-on Rise Time                |                                                                                      |          | 9    |      |      |
| t <sub>d(OFF)</sub>           | Turn-off Delay Time              |                                                                                      |          | 31   |      |      |
| t <sub>f</sub>                | Turn-off Fall Time               |                                                                                      |          | 10   |      |      |
| Gate Charge Characteristics ⑥ |                                  |                                                                                      |          |      |      |      |
| Q <sub>g</sub>                | Total Gate Charge                | V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>DS</sub> =20A                     |          | 38   |      | nC   |
| Q <sub>gs</sub>               | Gate-Source Charge               |                                                                                      |          | 5    |      |      |
| Q <sub>gd</sub>               | Gate-Drain Charge                |                                                                                      |          | 12   |      |      |

**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  $T_{Jmax}$ ,  $I_{AS} = 14\text{A}$ ,  $L = 0.5\text{mH}$ ,  $V_{DD} = 15\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$ .
- ⑤Pulse test; Pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- ⑥Guaranteed by design, not subject to production testing.

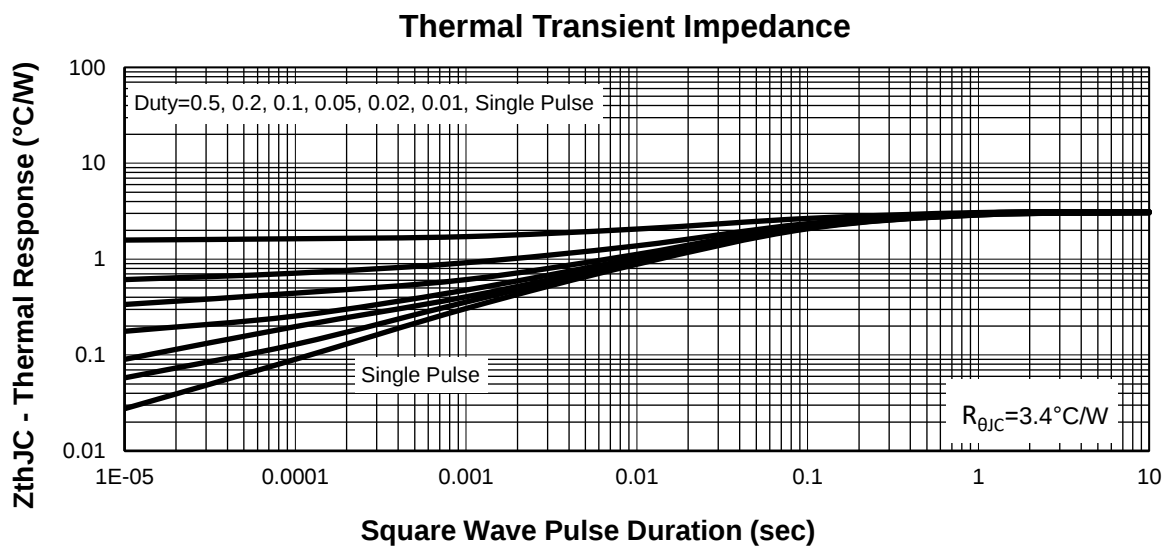
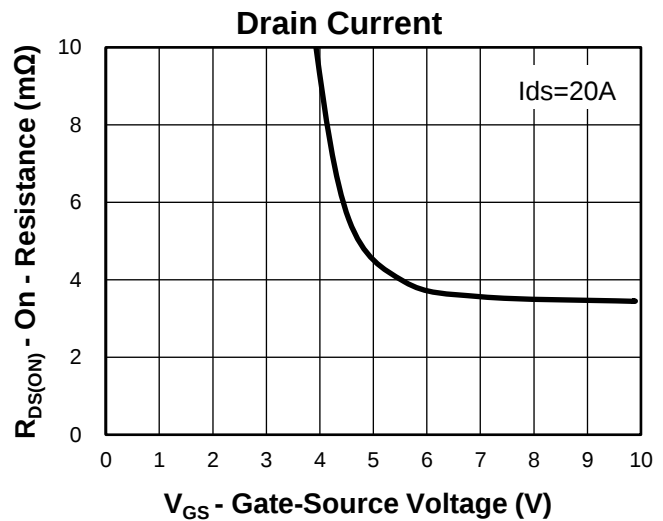
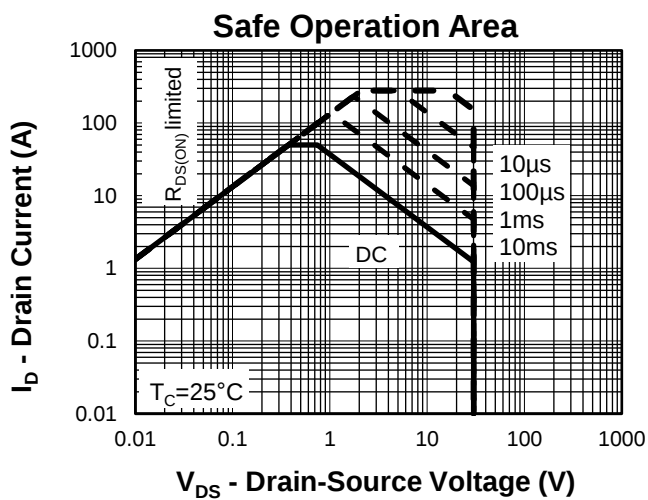
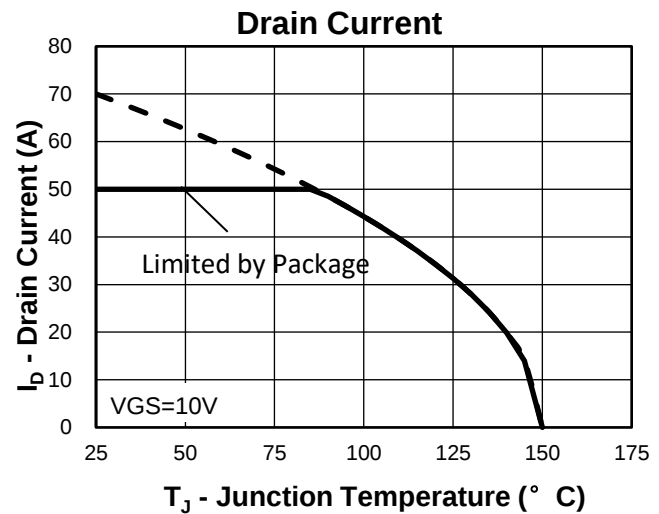
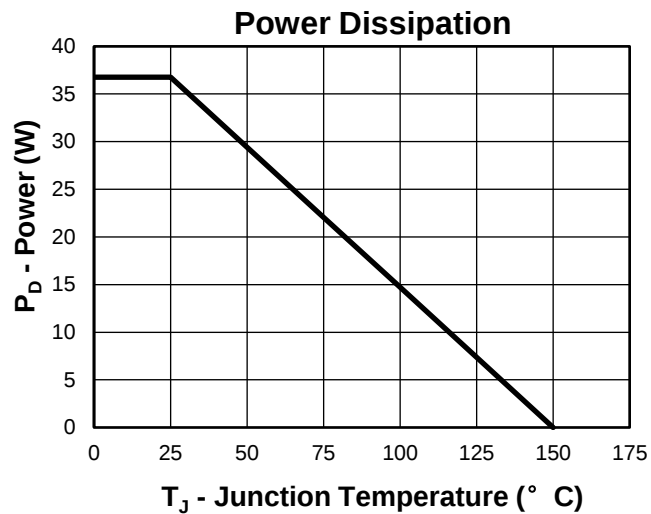
**Ordering and Marking Information**

| Device   | Package  | Packaging | Quantity | Reel Size | Tape width |
|----------|----------|-----------|----------|-----------|------------|
| KS3210ND | PDFN5060 | Tape&Reel | 5000     | 13"       | 12mm       |

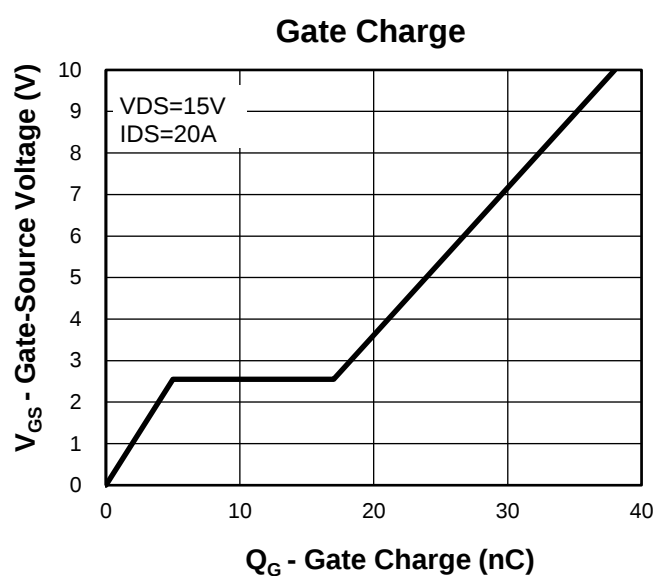
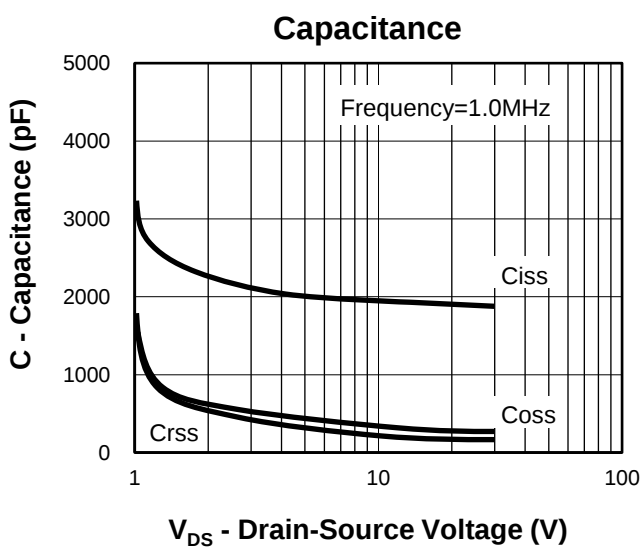
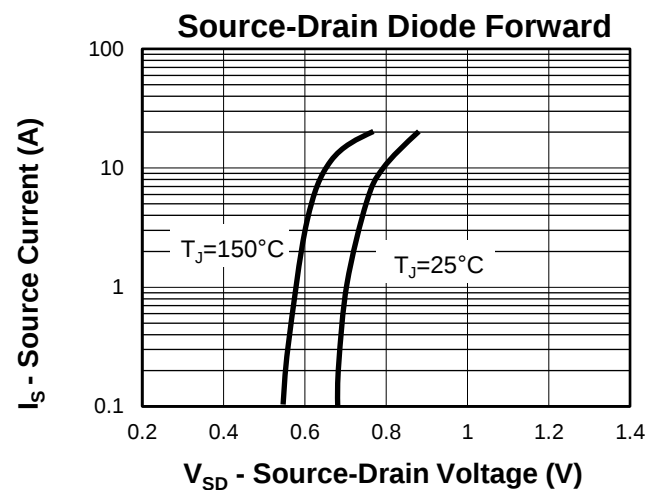
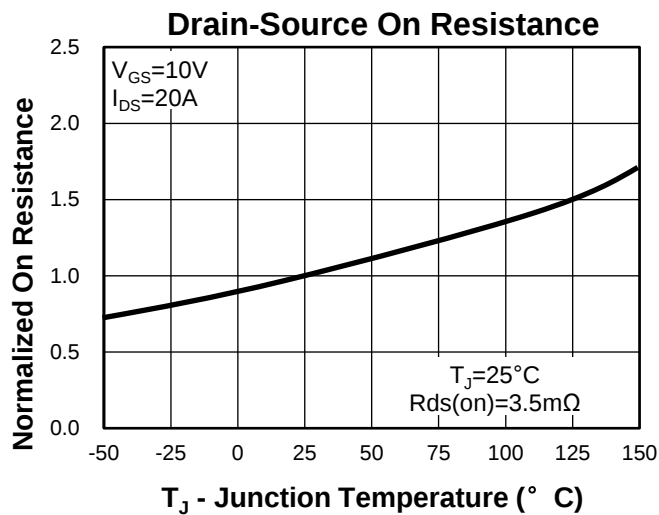
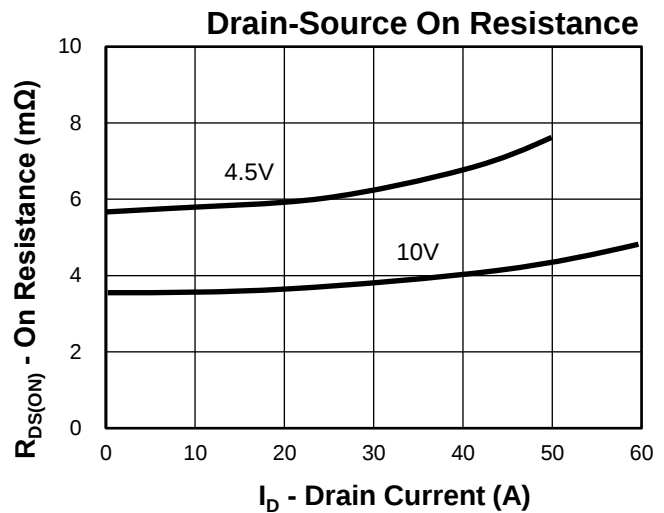
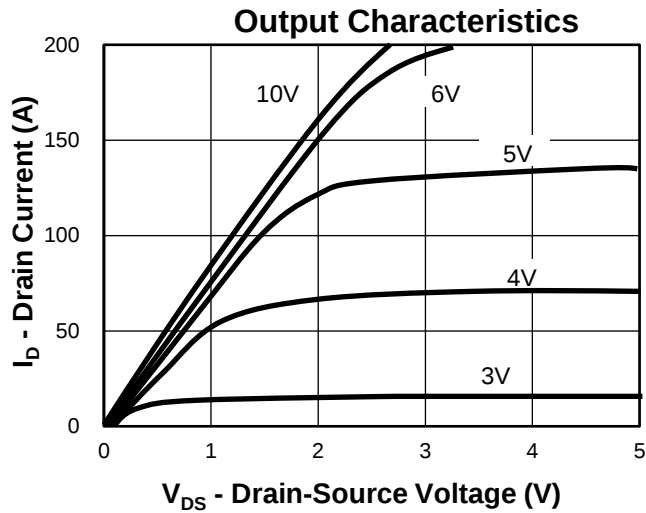


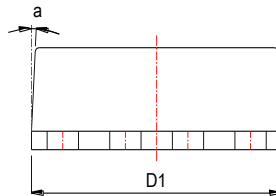
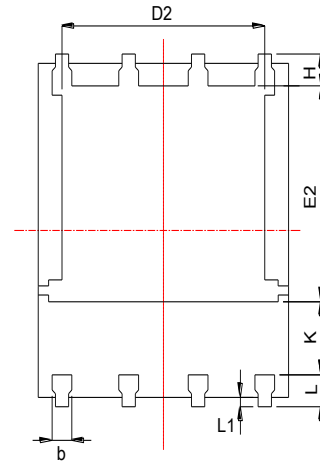
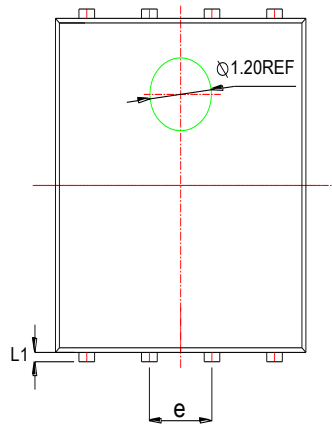
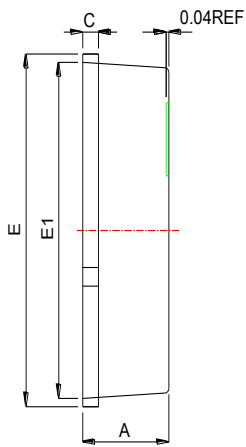
Y        =Year,2017-A,2018-B,etc.  
 WW      =Week.  
 XXX     =Lot number.

## Typical Characteristics

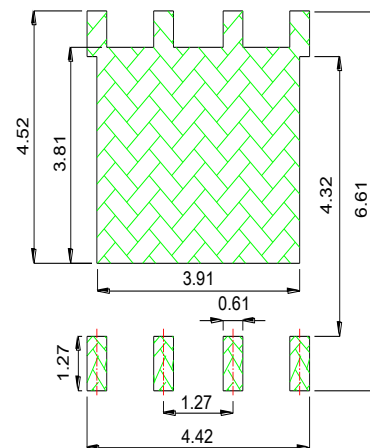


## Typical Characteristics



**Package Information**
**PDFN5060**


Land Pattern  
(Only for Reference)



| SYMBOL | MM       |      |      | INCH      |       |       |
|--------|----------|------|------|-----------|-------|-------|
|        | MIN      | NOM  | MAX  | MIN       | NOM   | MAX   |
| A      | 0.80     | 1.00 | 1.20 | 0.031     | 0.039 | 0.047 |
| b      | 0.33     | 0.42 | 0.51 | 0.013     | 0.017 | 0.020 |
| c      | 0.20     | 0.25 | 0.30 | 0.008     | 0.010 | 0.012 |
| D1     | 4.80     | 5.10 | 5.40 | 0.189     | 0.201 | 0.213 |
| D2     | 3.61     | 4.05 | 4.25 | 0.142     | 0.159 | 0.167 |
| E      | 5.85     | 6.15 | 6.30 | 0.230     | 0.242 | 0.248 |
| E1     | 5.45     | 5.85 | 5.95 | 0.215     | 0.230 | 0.234 |
| E2     | 3.27     | 3.58 | 3.92 | 0.129     | 0.141 | 0.154 |
| e      | 1.27 BSC |      |      | 0.050 BSC |       |       |
| H      | 0.41     | 0.61 | 0.71 | 0.016     | 0.024 | 0.028 |
| k      | 1.10     | *    | *    | 0.043     | *     | *     |
| L      | 0.51     | 0.61 | 0.71 | 0.020     | 0.024 | 0.028 |
| L1     | 0.06     | 0.15 | 0.22 | 0.002     | 0.006 | 0.009 |
| a      | 0°       | *    | 12°  | 0°        | *     | 12°   |

### Avalanche Test Circuit and Waveforms



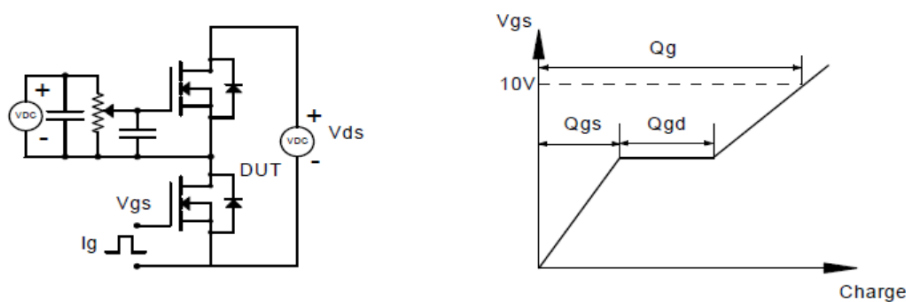
### Switching Time Test Circuit and Waveforms



### Diode Recovery Test Circuit and Waveforms



### Gate Charge Test Circuit and Waveform



### Customer Service

Kwansemi Semiconductor Co.,Ltd

Email:Sales@kwansemi.com

Web:www.kwansemi.com

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