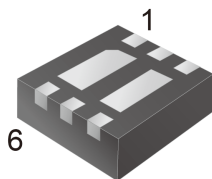




TDFN 2x2



Pin Definition:

- | | |
|----------|------------|
| 1. Anode | 6. Cathode |
| 2. NC | 5. Gate |
| 3. Drain | 4. Source |

PRODUCT SUMMARY

| V _{DS} (V) | R _{DS(on)} (mΩ) | I _D (A) |
|---------------------|-------------------------------|--------------------|
| -20 | 94 @ V _{GS} = -4.5V | -2.8 |
| | 131 @ V _{GS} = -2.5V | -2.3 |
| | 185 @ V _{GS} = -1.8V | -0.54 |

SCHOTTKY PRODUCT SUMMARY

| V _R (V) | V _F (V) | I _F (A) |
|--------------------|--------------------|--------------------|
| 20 | 0.5 | 2 |

Features

- Configuration with MOSFET and Low Vf SKY
- Package low profile 0.75mm (Typ)
- Independent Pin Out for Design Flexibility

Application

- Load Switch for Portable Applications
- DC-DC Buck Circuit
- Li-ion Battery Applications
- Cellular Charger Switch

Ordering Information

| Part No. | Package | Packing |
|-----------------|----------|-----------------|
| TSM301K12CQ RFG | TDFN 2x2 | 3Kpcs / 7" Reel |

Note: "G" denotes for Halogen Free

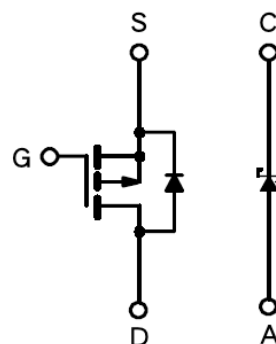
MOSFET Absolute Maximum Rating (T_A=25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|--|-----------------------------------|-------------------------------|--------|
| Drain-Source Voltage | V _{DS} | -20 | V |
| Gate-Source Voltage | V _{GS} | ±12 | V |
| Continuous Drain Current (Note 1,2) | I _D | -4.5 | A |
| Pulsed Drain Current | I _{DM} | -8 | A |
| Maximum Power Dissipation | P _D | T _C =25°C | 6.5 W |
| | | T _A =25°C (Note 2) | 1.56 W |
| Operating Junction Temperature | T _J | +150 | °C |
| Operating Junction and Storage Temperature Range | T _J , T _{STG} | - 55 to +150 | °C |

Schottky Absolute Maximum Rating (T_A=25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|------------------------------------|-----------------|-------------------------------|--------|
| Reverse Voltage | V _R | 20 | V |
| Average Forward Current (Note 1,2) | I _F | 2 | A |
| Pulsed Forward Current | I _{FM} | 5 | A |
| Maximum Power Dissipation (Note 1) | P _D | T _C =25°C | 6.8 W |
| | | T _A =25°C (Note 2) | 1.47 W |

Block Diagram



P-Channel MOSFET with Schottky Diode

Thermal Resistance Ratings

| Parameter | Symbol | Limit | Unit | |
|--|--------------|----------------|------|---------------|
| MOSFET | | | | |
| Thermal Resistance-Junction to Ambient | $T \leq 5s$ | $R\theta_{JA}$ | 80 | $^{\circ}C/W$ |
| | Steady State | | 120 | $^{\circ}C/W$ |
| Schottky | | | | |
| Thermal Resistance-Junction to Ambient | $T \leq 5s$ | $R\theta_{JA}$ | 85 | $^{\circ}C/W$ |
| | Steady State | | 130 | $^{\circ}C/W$ |

Notes:

1. Surface mounted on 1" x 1" (2 oz) FAR4 board,
2. $t \leq 5s$

MOSFET Electrical Specifications (Ta = 25°C unless otherwise noted)

| Parameter | Conditions | Symbol | Min | Typ | Max | Unit |
|---|---|--------------|------|------|-----------|------------|
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = -250\mu A$ | BV_{DSS} | -20 | -- | -- | V |
| Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = -250\mu A$ | $V_{GS(TH)}$ | -0.5 | -- | -- | V |
| Gate Body Leakage | $V_{GS} = \pm 12V, V_{DS} = 0V$ | I_{GSS} | -- | -- | ± 100 | nA |
| Zero Gate Voltage Drain Current | $V_{DS} = -20V, V_{GS} = 0V$ | I_{DSS} | -- | -- | -1 | μA |
| Drain-Source On-State Resistance ^a | $V_{GS} = -4.5V, I_D = -2.8A$ | $R_{DS(ON)}$ | -- | -- | 94 | m Ω |
| | $V_{GS} = -2.5V, I_D = -2.3A$ | | -- | -- | 131 | |
| | $V_{GS} = -1.8V, I_D = -0.54A$ | | -- | -- | 185 | |
| Diode Forward Voltage | $I_S = -1.6A, V_{GS} = 0V$ | V_{SD} | -- | -- | -1.2 | V |
| Dynamic^b | | | | | | |
| Total Gate Charge | $V_{DS} = -6V, I_D = -2.8A, V_{GS} = -5V$ | Q_g | -- | 5.2 | 10 | nC |
| Gate-Source Charge | | Q_{gs} | -- | 1.36 | -- | |
| Gate-Drain Charge | | Q_{gd} | -- | 0.6 | -- | |
| Input Capacitance | $V_{GS} = 0V, V_{DS} = -6V, f = 1.0MHz$ | C_{iss} | -- | 5.2 | -- | pF |
| Output Capacitance | | C_{oss} | -- | 9.7 | -- | |
| Reverse Transfer Capacitance | | C_{rss} | -- | 19 | -- | |
| Switching^c | | | | | | |
| Turn-On Delay Time | $V_{DS} = -15V, R_D = 15\Omega, R_G = 6\Omega, V_{GS} = -10V$ | $t_{d(on)}$ | -- | 29 | -- | nS |
| Turn-On Rise Time | | t_r | -- | 295 | -- | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 170 | -- | |
| Turn-Off Fall Time | | t_f | -- | 65 | -- | |

Schottky Electrical Specifications (Ta = 25°C unless otherwise noted)

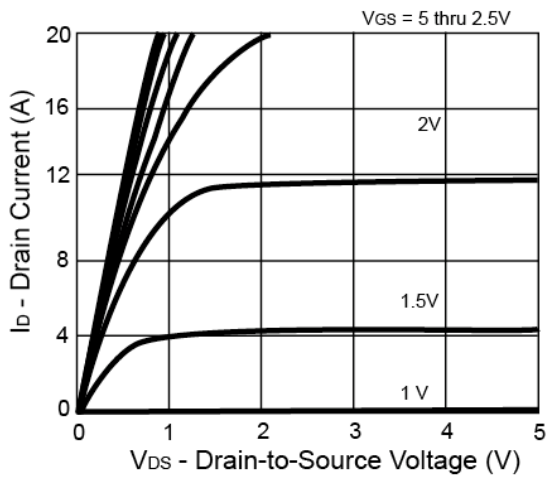
| Parameter | Conditions | Symbol | Min | Typ | Max | Unit |
|---------------------------------|-------------|----------|-----|-------|------|------|
| Forward Voltage Drop | $I_F = 1A$ | V_F | -- | -- | 0.5 | V |
| Maximum Reverse Leakage Current | $V_R = 5V$ | I_{Rm} | -- | 0.015 | 0.08 | mA |
| | $V_R = 20V$ | | -- | 0.02 | 0.10 | |
| Junction Capacitance | $V_R = 10V$ | C_T | -- | 60 | -- | pF |

Notes:

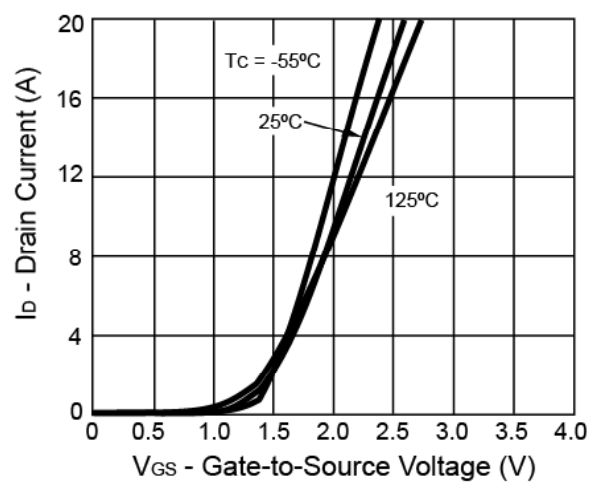
- a. pulse test: $PW \leq 300\mu S$, duty cycle $\leq 2\%$
- b. For DESIGN AID ONLY, not subject to production testing.
- c. Switching time is essentially independent of operating temperature.

MOSFET Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

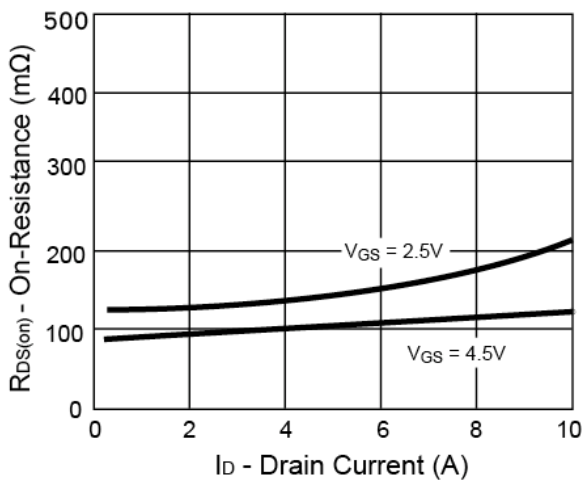
Output Characteristics



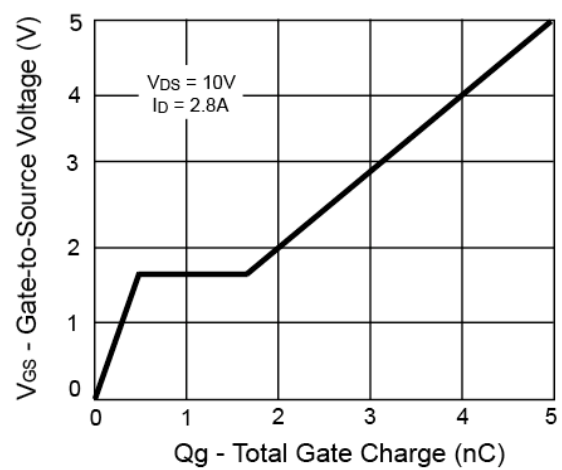
Transfer Characteristics



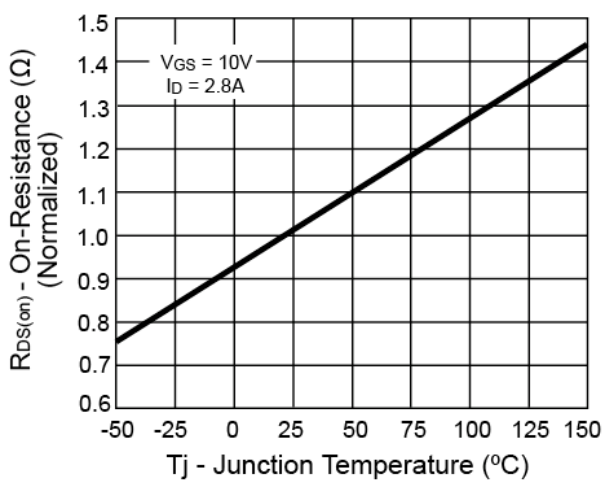
On-Resistance vs. Drain Current



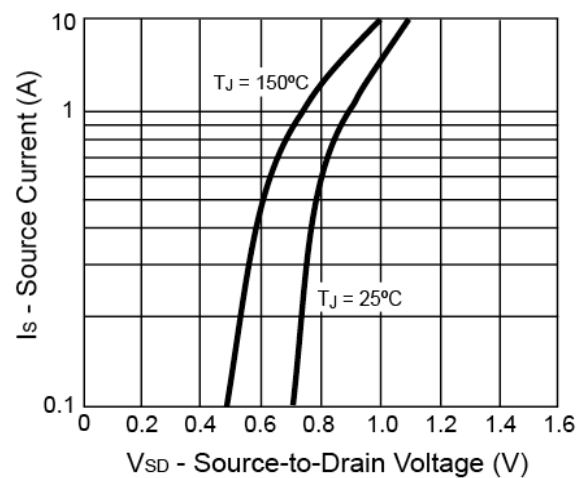
Gate Charge



On-Resistance vs. Junction Temperature

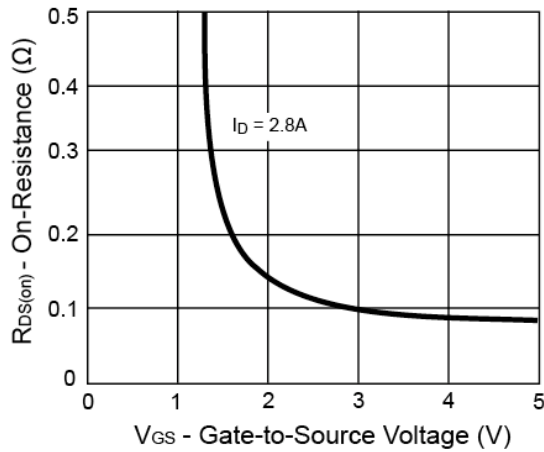


Source-Drain Diode Forward Voltage

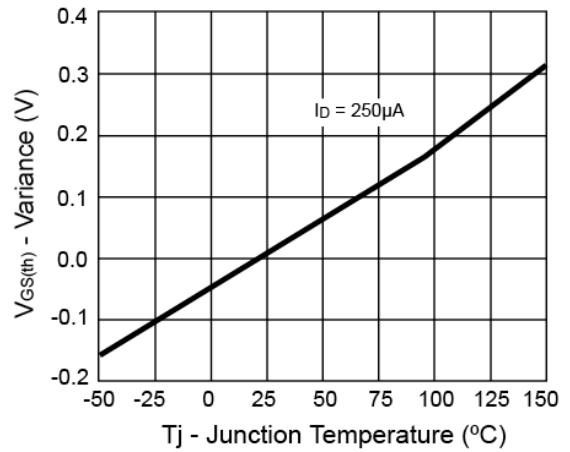


Electrical Characteristics Curve ($T_a = 25^\circ\text{C}$, unless otherwise noted)

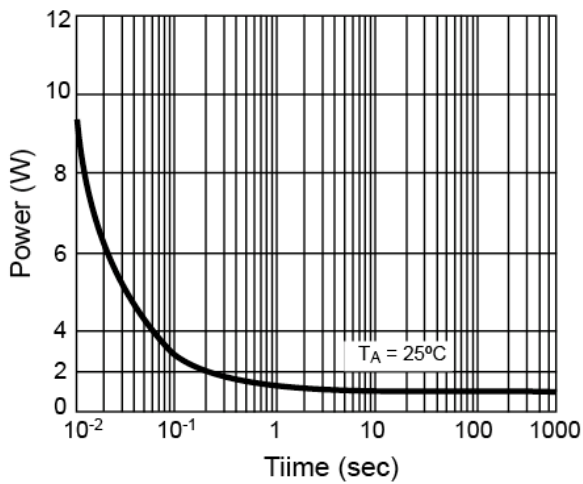
On-Resistance vs. Gate-Source Voltage



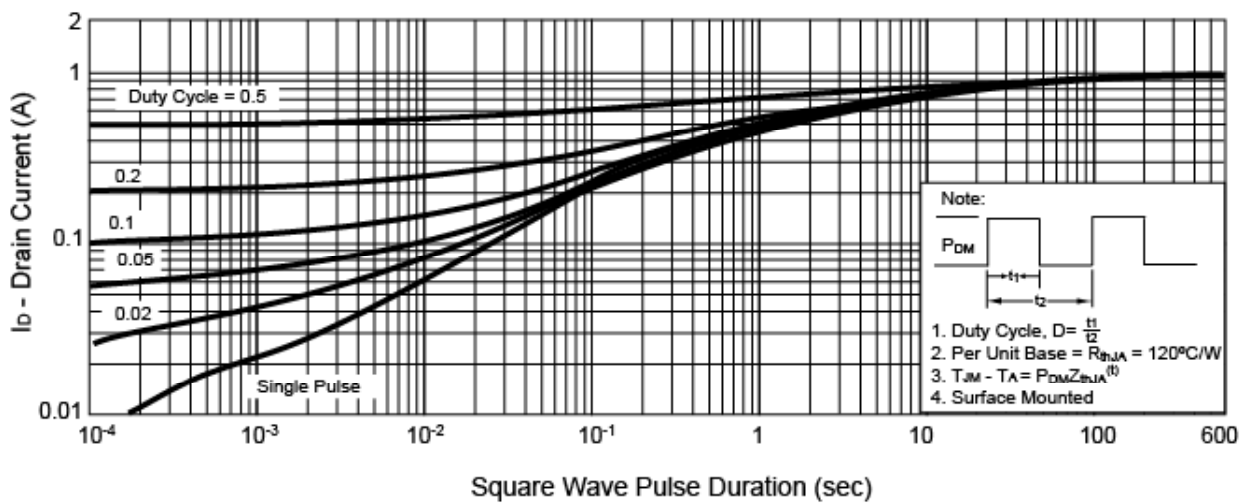
Threshold Voltage



Single Pulse Power

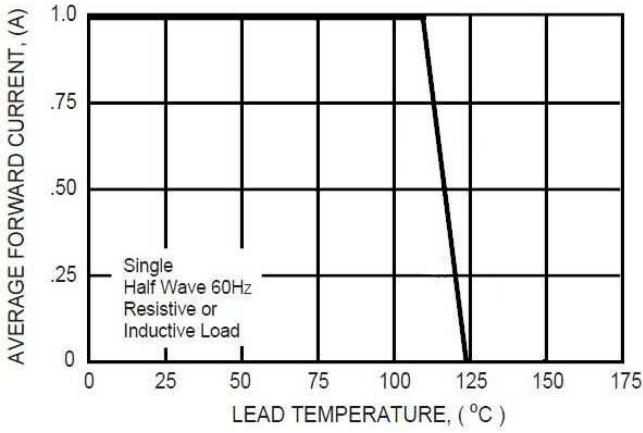


Normalized Thermal Transient Impedance, Junction-to-Ambient

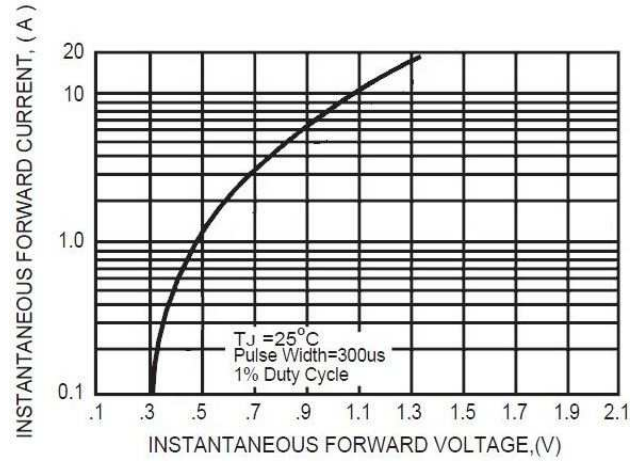


SCHOTTKY Electrical Characteristics Curve (Ta = 25°C, unless otherwise noted)

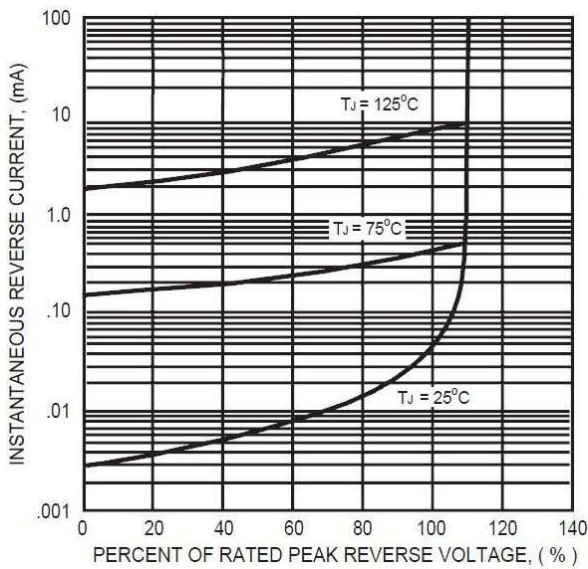
Typical Forward Current Derating Curve



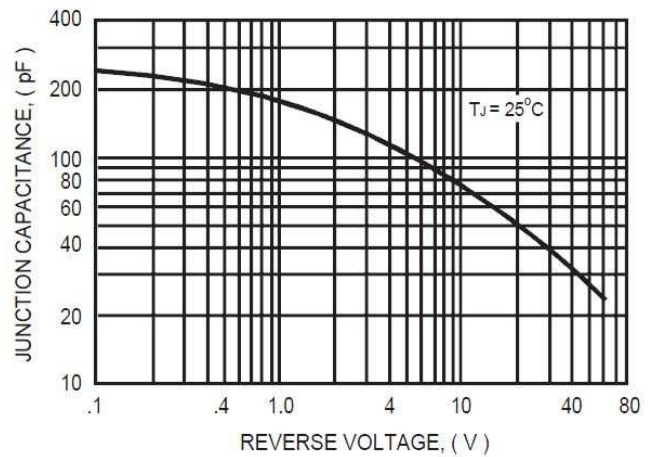
Typical Instantaneous Forward Characteristics



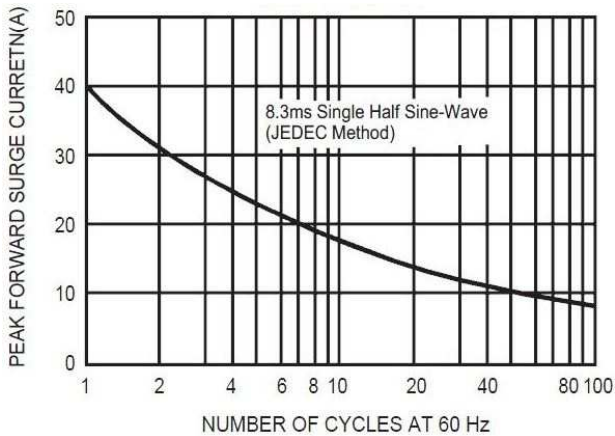
Typical Reverse Characteristics



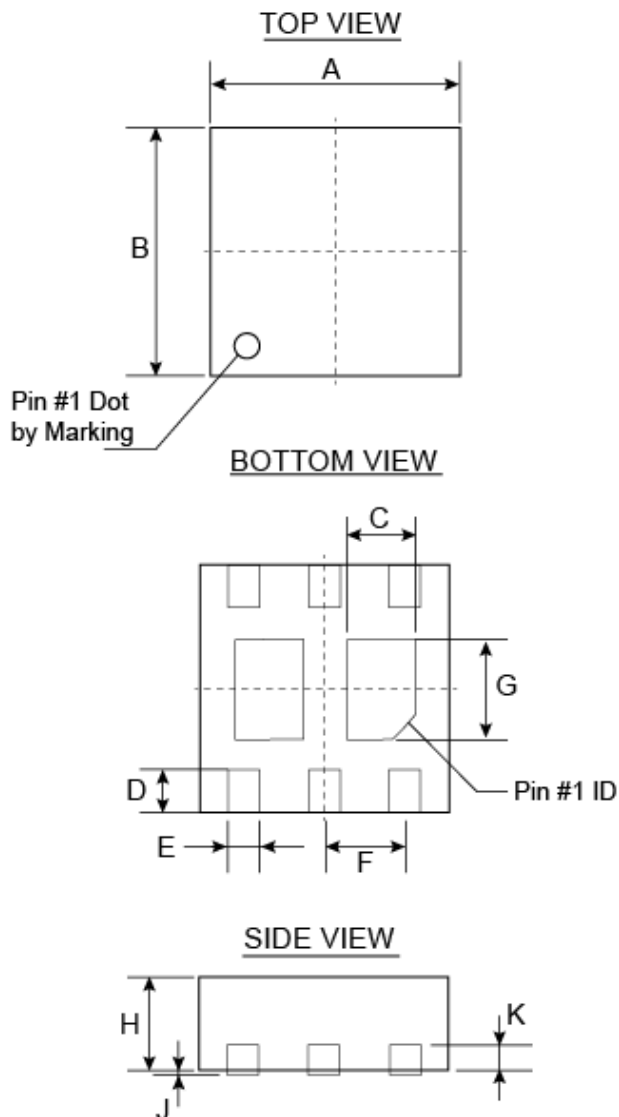
Typical Junction Capacitance



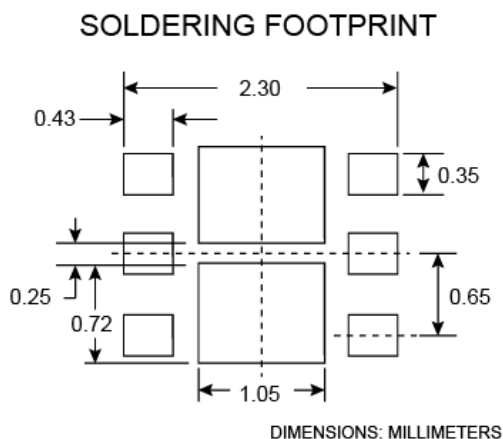
Maximum Repetitive Forward Surge Current



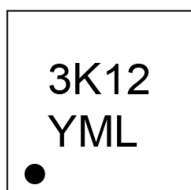
TDFN 2x2 Mechanical Drawing



| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|------------|--------|
| | MIN | MAX | MIN | MAX |
| A | 1.95 | 2.05 | 0.0768 | 0.0807 |
| B | 1.95 | 2.05 | 0.0768 | 0.0807 |
| C | 0.50 | 0.60 | 0.0197 | 0.0236 |
| D | 0.30 | 0.40 | 0.0118 | 0.0157 |
| E | 0.20 | 0.30 | 0.0079 | 0.0118 |
| F | 0.65 BSC | | 0.0256 BSC | |
| G | 0.75 | 0.85 | 0.0295 | 0.0335 |
| H | 0.70 | 0.80 | 0.0276 | 0.0315 |
| J | -- | 0.05 | - | 0.0020 |
| K | 0.195 | 0.211 | 0.0077 | 0.0083 |



Marking Diagram



- Y** = Year Code
- M** = Month Code for Halogen Free Product
(O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
- L** = Lot Code

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