

# 30V, 52A, 6.1mΩ N-channel Power Trench MOSFET

## JMTQ3006C

### Features

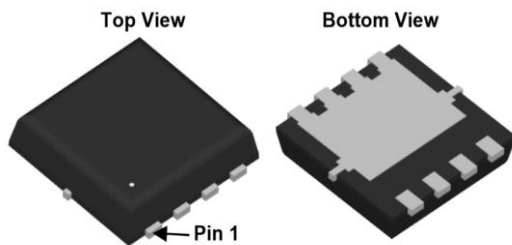
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- 100% UIS Tested
- 100%  $\Delta V_{ds}$  Tested
- Halogen-free; RoHS-compliant
- Pb-free plating

### Applications

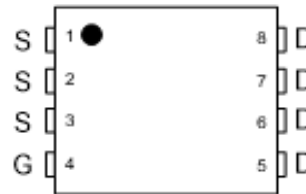
- Load Switch
- PWM Application
- Power Management

### Product Summary

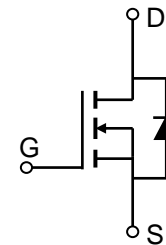
Parameters	Value	Unit
$V_{DSS}$	30	V
$V_{GS(th)_{Typ}}$	1.7	V
$I_D(@V_{GS}=10V)$	52	A
$R_{DS(ON)_{Typ}}(@V_{GS}=10V)$	4.3	mΩ
$R_{DS(ON)_{Typ}}(@V_{GS}=4.5V)$	6.1	mΩ



PDFN3x3-8L



Pin Assignment



Schematic Diagram

### Ordering Information

Device	Marking	MSL	Form	Package	Reel(pcs)	Per Carton (pcs)
JMTQ3006C	Q3006C	1	Tape&Reel	PDFN3x3-8L	5000	50000

### Absolute Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-to-Source Voltage	30	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C = 25^\circ\text{C}$	52
		$T_C = 100^\circ\text{C}$	33
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	Refer to Fig.4	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(2)</sup>	54	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	26
		$T_C = 100^\circ\text{C}$	10
$T_J, T_{STG}$	Junction & Storage Temperature Range	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>(3)</sup>	52	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	4.8	

**Electrical Characteristics** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$	-	-	1.0	$\mu\text{A}$
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1.2	1.7	2.2	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance <sup>(4)</sup>	$V_{GS} = 10\text{V}, I_D = 30\text{A}$	-	4.3	5.6	$\text{m}\Omega$
		$V_{GS} = 4.5\text{V}, I_D = 20\text{A}$	-	6.1	7.9	$\text{m}\Omega$
<b>Dynamic Characteristics</b>						
$R_g$	Gate Resistance	$f = 1\text{MHz}$	-	2.7	-	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 15\text{V}, f = 1\text{MHz}$	1152	1612	2177	pF
$C_{oss}$	Output Capacitance		137	192	259	pF
$C_{rss}$	Reverse Transfer Capacitance		117	164	222	pF
$Q_g$	Total Gate Charge	$V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DS} = 15\text{V}, I_D = 30\text{A}$	24	33	45	nC
$Q_{gs}$	Gate Source Charge		-	6	-	nC
$Q_{gd}$	Gate Drain("Miller") Charge		-	7	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On DelayTime	$V_{GS} = 10\text{V}, V_{DD} = 15\text{V}$ $I_D = 30\text{A}, R_{GEN} = 3\Omega$	-	7	-	ns
$t_r$	Turn-On Rise Time		-	15	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	31	-	ns
$t_f$	Turn-Off Fall Time		-	8	-	ns
<b>Body Diode Characteristics</b>						
$I_S$	Maximum Continuous Body Diode Forward Current		-	-	52	A
$I_{SM}$	Maximum Pulsed Body Diode Forward Current		-	-	209	A
$V_{SD}$	Body Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 30\text{A}$	-		1.2	V
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F = 20\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	8	-	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge		-	1.8	-	nC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  2.  $E_{AS}$  condition: Starting  $T_J = 25^\circ\text{C}$ ,  $V_{DD} = 15\text{V}$ ,  $V_{GS} = 10\text{V}$ ,  $R_G = 25\text{ohm}$ ,  $L = 0.5\text{mH}$ ,  $I_{AS} = 14.7\text{A}$ ,  $V_{DD} = 0\text{V}$  during time in avalanche.
  3.  $R_{\theta JA}$  is measured with the device mounted on a  $1\text{inch}^2$  pad of 2oz copper FR4 PCB.
  4. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$ .



## Typical Performance Characteristics

Figure 1: Power De-rating

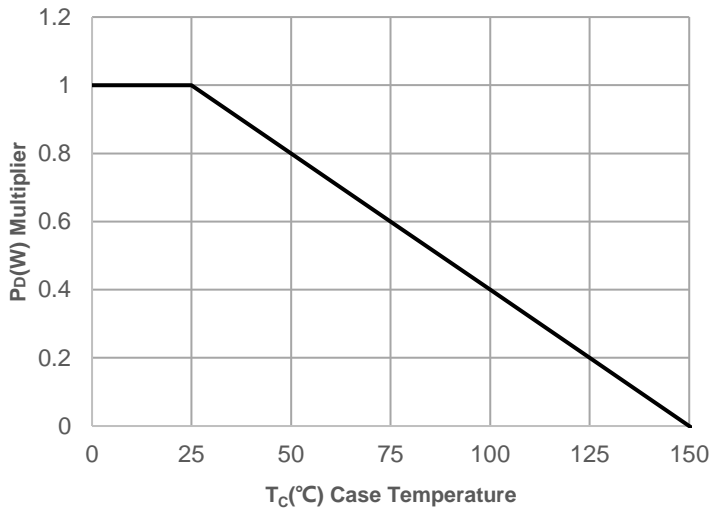


Figure 2: Current De-rating

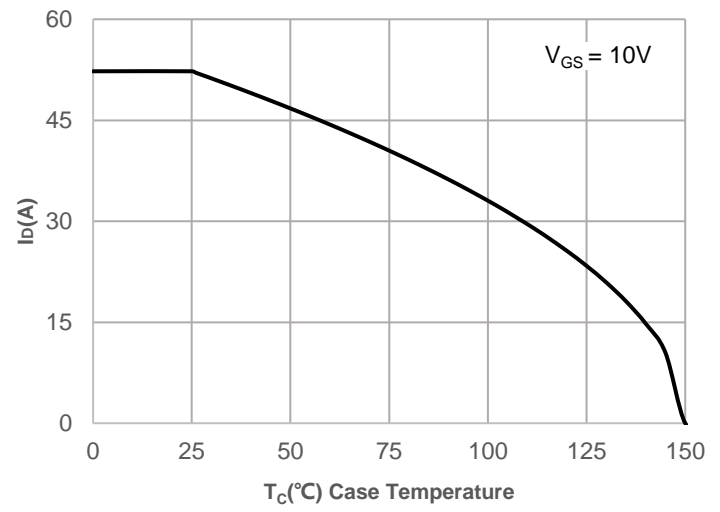


Figure 3: Normalized Maximum Transient Thermal Impedance

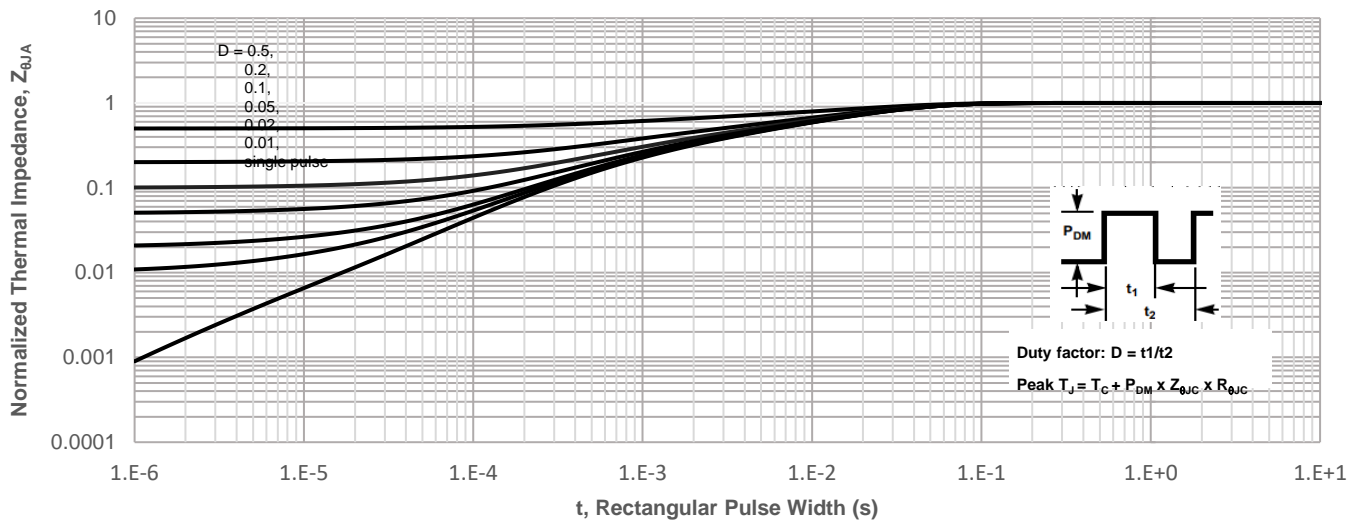
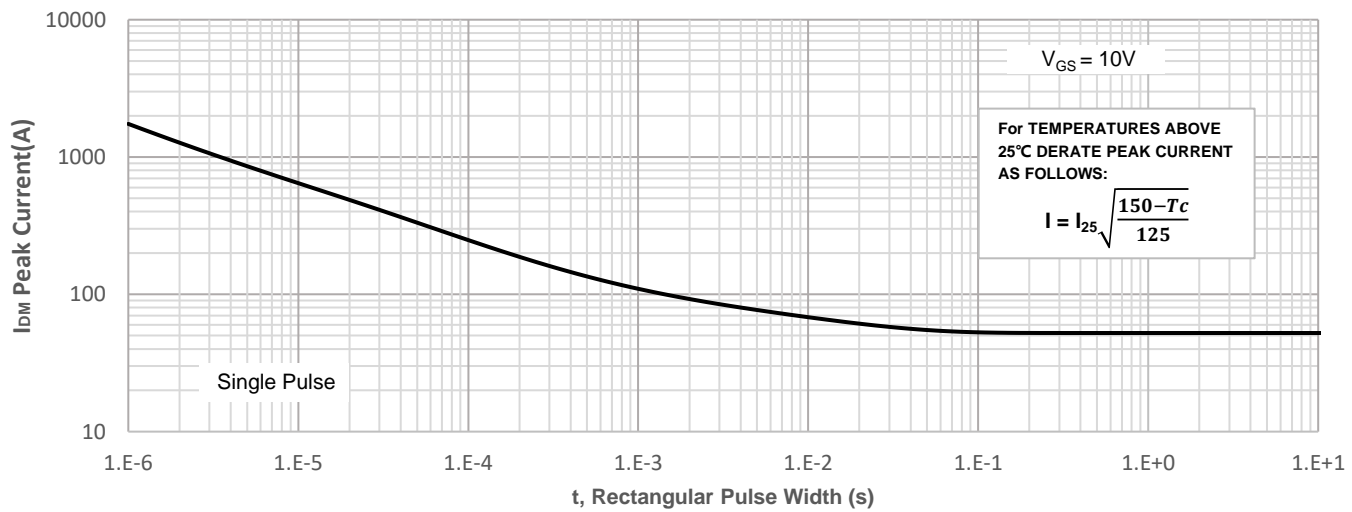
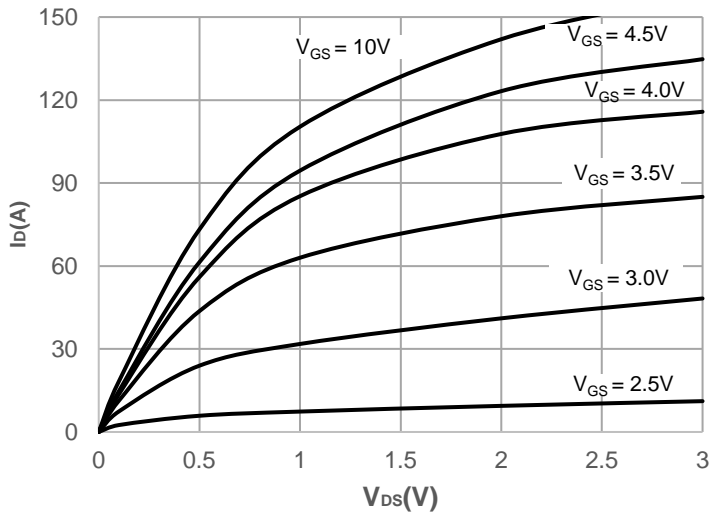
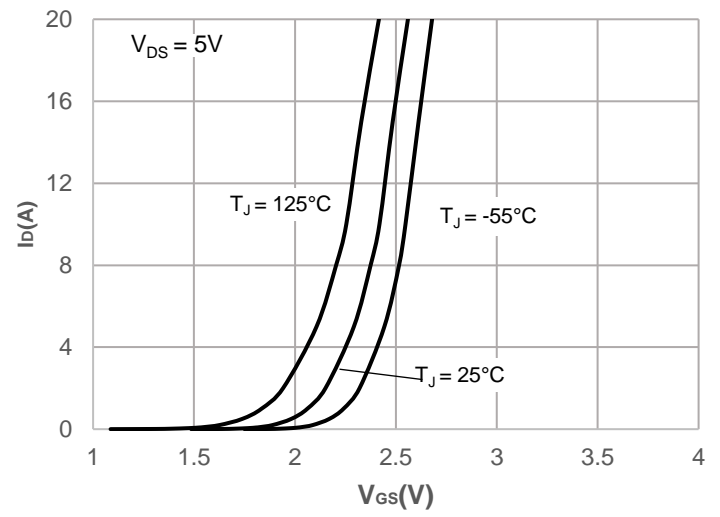
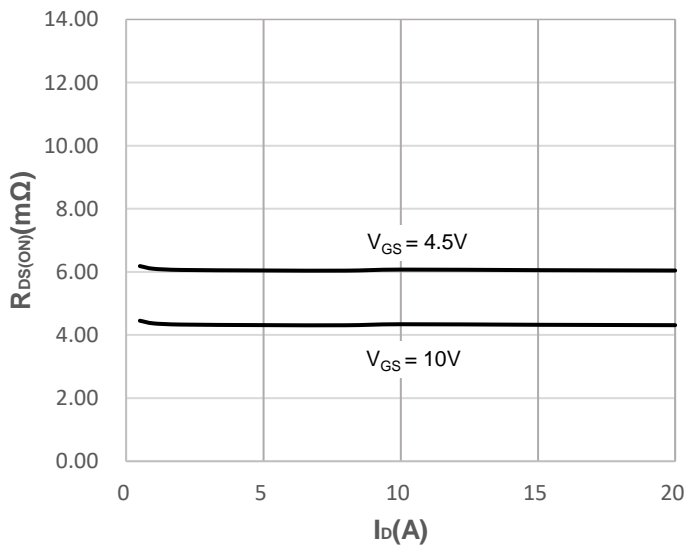
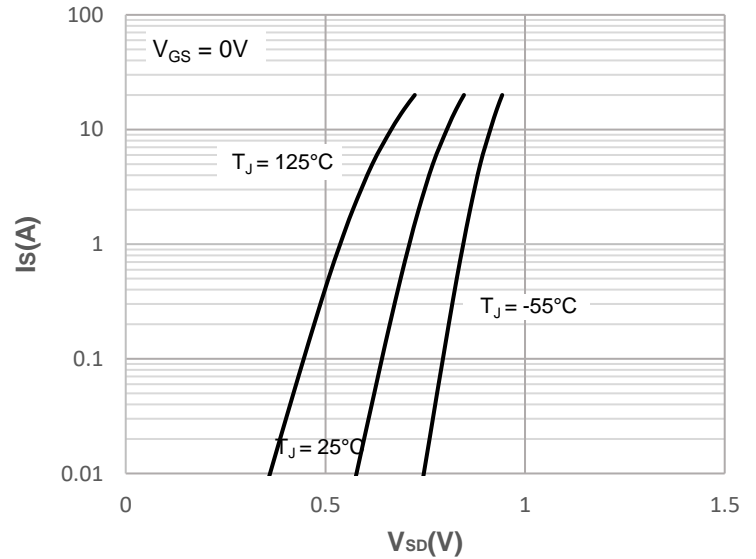
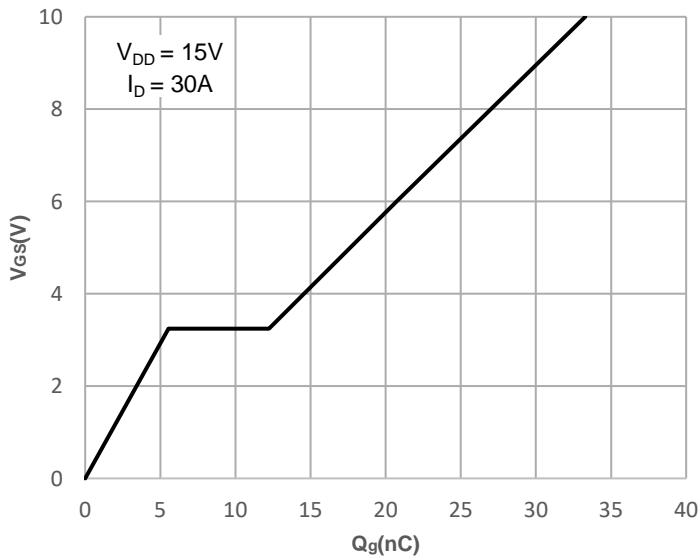
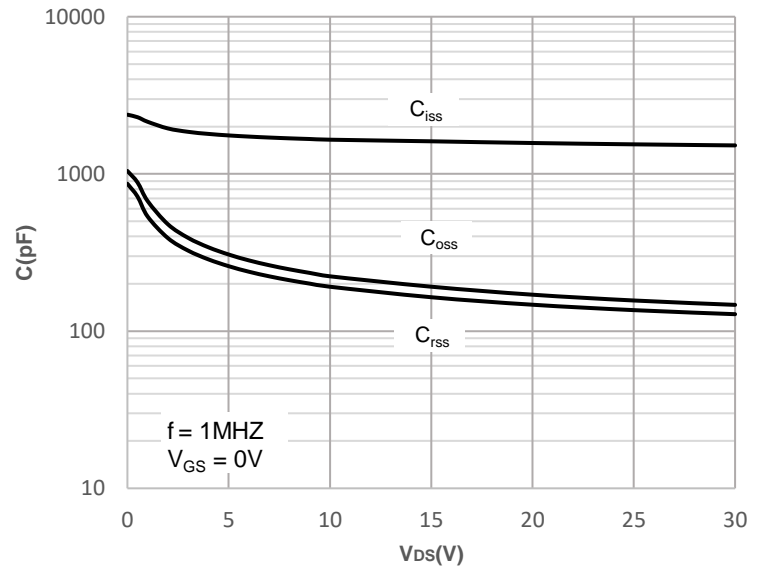


Figure 4: Peak Current Capacity



## Typical Performance Characteristics

**Figure 5: Output Characteristics**

**Figure 6: Typical Transfer Characteristics**

**Figure 7: On-resistance vs. Drain Current**

**Figure 8: Body Diode Characteristics**

**Figure 9: Gate Charge Characteristics**

**Figure 10: Capacitance Characteristics**


## Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

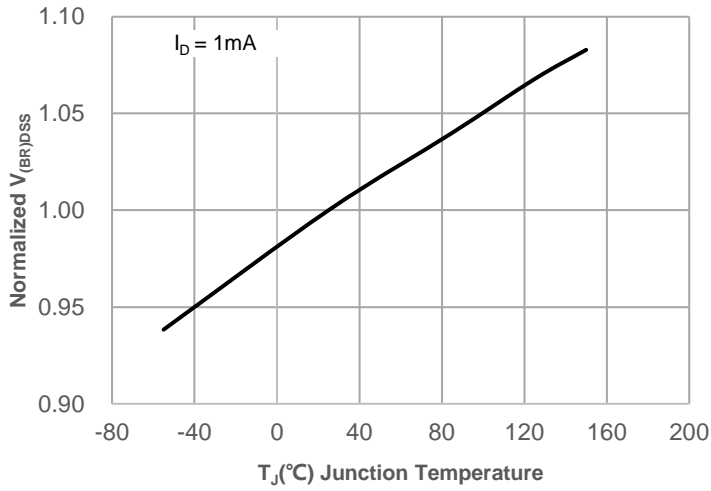


Figure 12: Normalized on Resistance vs. Junction Temperature

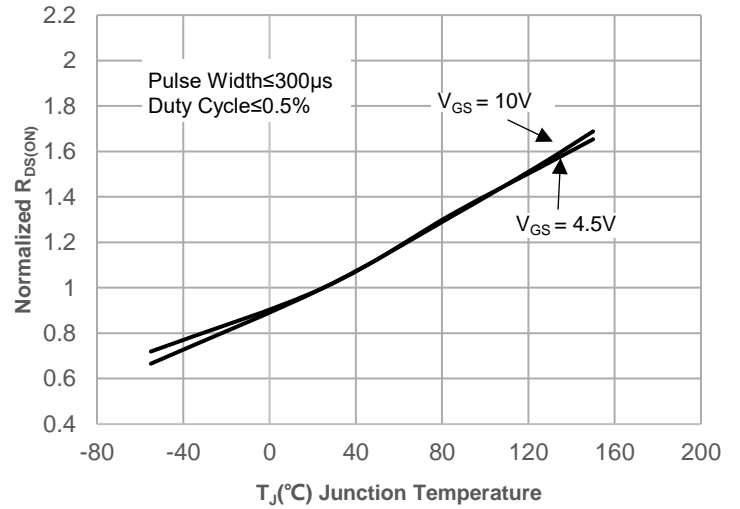


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

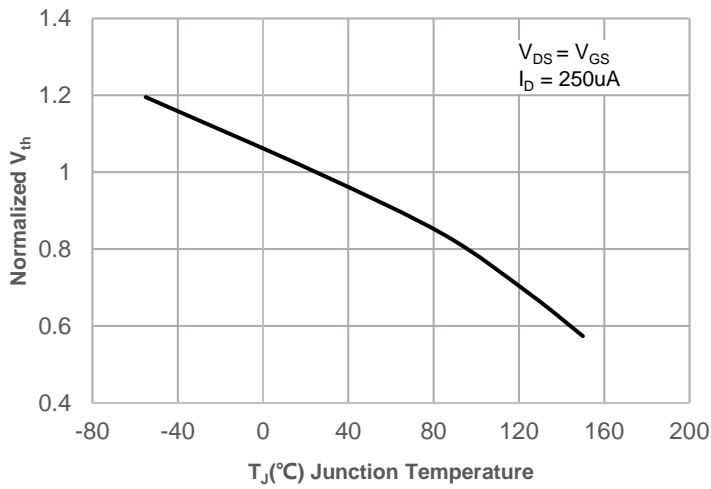


Figure 14:  $R_{DS(ON)}$  vs.  $V_{GS}$

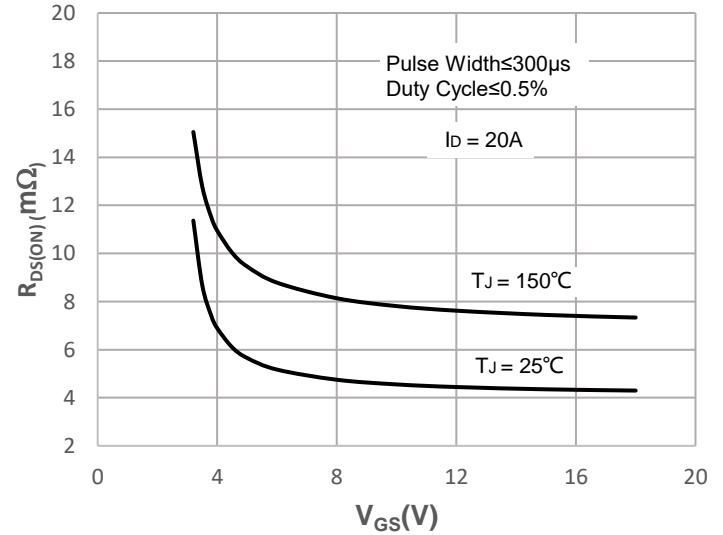
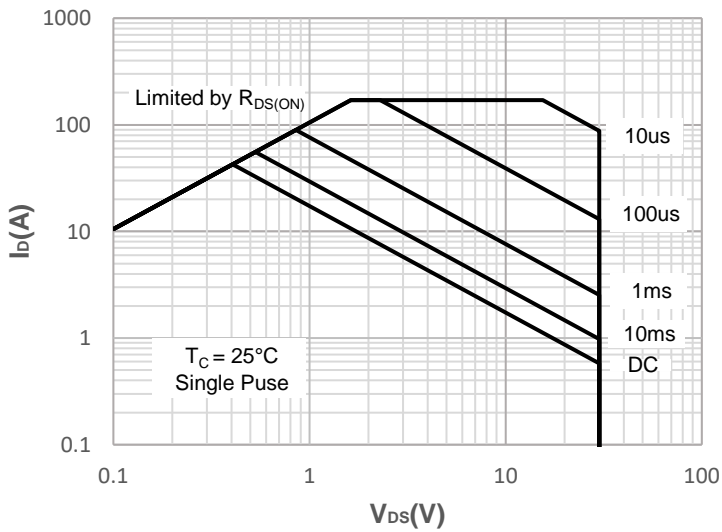
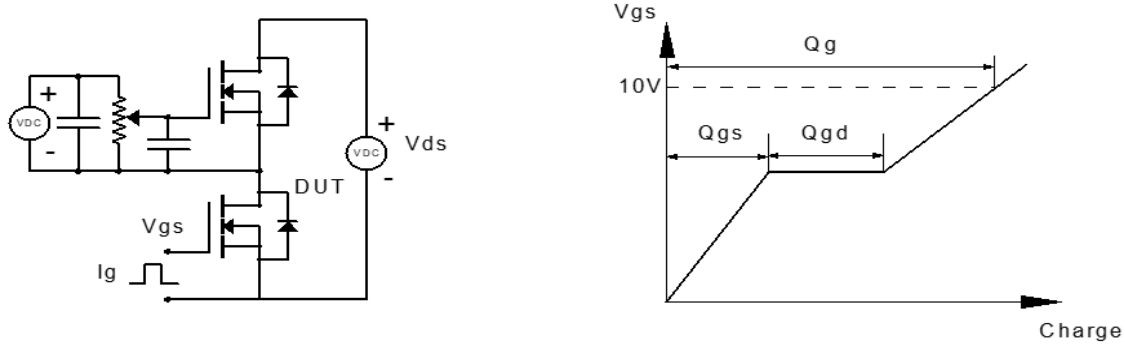
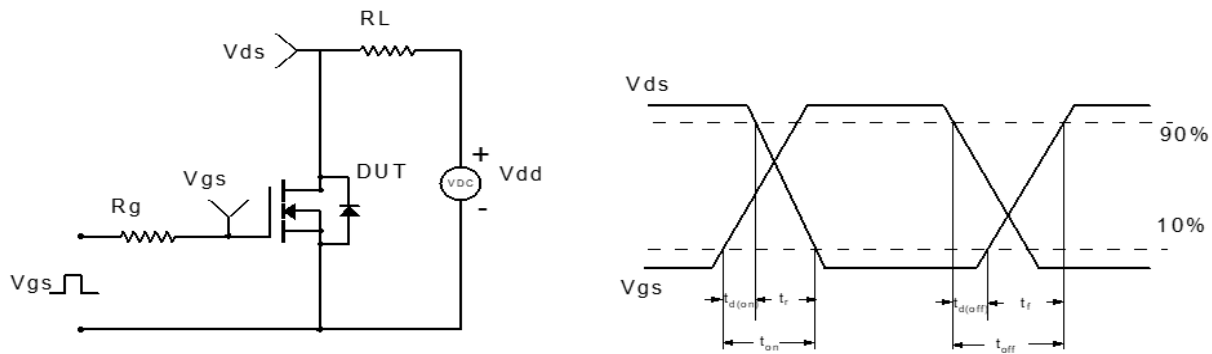
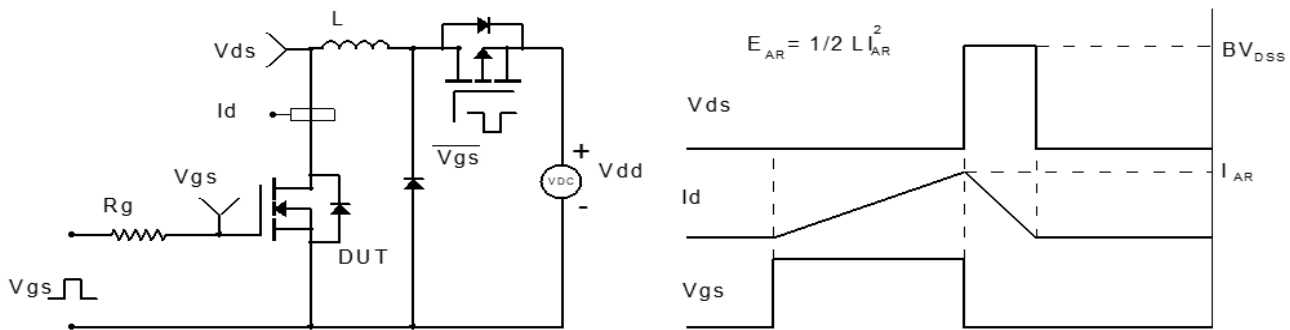
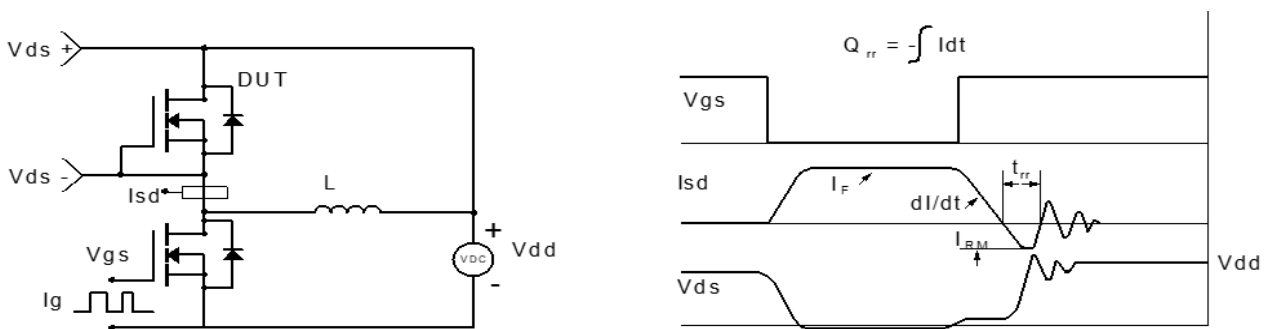
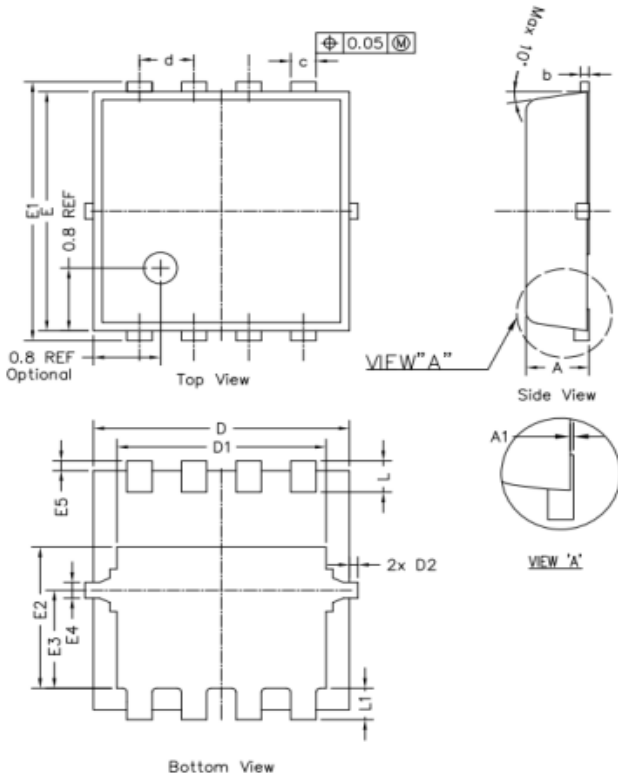


Figure 15: Maximum Safe Operating Area



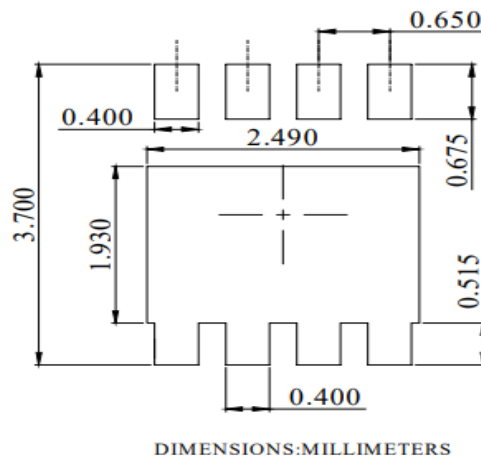
**Test Circuit**

**Figure 1: Gate Charge Test Circuit & Waveform**

**Figure 2: Resistive Switching Test Circuit & Waveform**

**Figure 3: Unclamped Inductive Switching Test Circuit & Waveform**

**Figure 4: Diode Recovery Test Circuit & Waveform**

Package Mechanical Data(PDFN3x3-8L)



SYMBOLS	DIMENSION IN MM			DIMENSION IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.700	0.750	0.800	0.028	0.030	0.031
A1	---	---	0.050	----	----	0.002
b	0.144	0.152	0.202	0.006	0.006	0.008
c	0.250	0.300	0.350	0.010	0.012	0.014
d	0.65 BSC			0.026 BSC		
D	2.950	3.050	3.150	0.116	0.120	0.124
D1	2.390	2.490	2.590	0.094	0.098	0.102
D2	---	---	0.125	---	---	0.005
E	2.950	3.050	3.150	0.116	0.120	0.124
E1	3.200	3.300	3.400	0.126	0.130	0.134
E2	1.700	1.800	1.900	0.067	0.071	0.075
E3	1.150	1.250	1.350	0.045	0.049	0.053
E4	0.150	0.200	0.250	0.006	0.008	0.010
E5	0.075	0.125	0.175	0.003	0.005	0.007
L	0.300	0.400	0.500	0.01	0.02	0.02
L1	0.300	0.400	0.500	0.01	0.02	0.02

Recommended Soldering Footprint



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