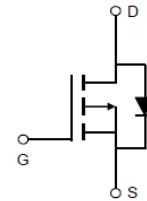


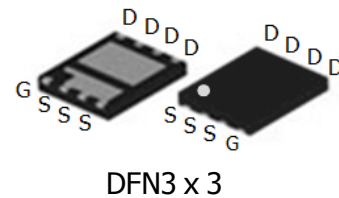
## Feature

- -20V,-60A  
 $R_{DS(ON)} < 7.0m\Omega @ V_{GS} = -4.5V$   
 $R_{DS(ON)} < 9.0m\Omega @ V_{GS} = -2.5V$
- Advanced Trench Technology
- Lead free product is acquired
- Excellent  $R_{DS(ON)}$  and Low Gate Charge



## Application

- PWM applications
- Load Switch
- Power management



## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
60P20Q	AP60P20Q	PDFN3X3-8L	13 inch	-	5000

## ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current ( $T_a = 25^\circ\text{C}$ )	$I_D$	-60	A
Continuous Drain Current ( $T_a = 100^\circ\text{C}$ )	$I_D$	-42	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	-240	A
Power Dissipation	$P_D$	80	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.6	$^\circ\text{C}/\text{W}$
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55~ +150	$^\circ\text{C}$

**MOSFET ELECTRICAL CHARACTERISTICS**( $T_a=25^{\circ}\text{C}$  unless otherwise noted)

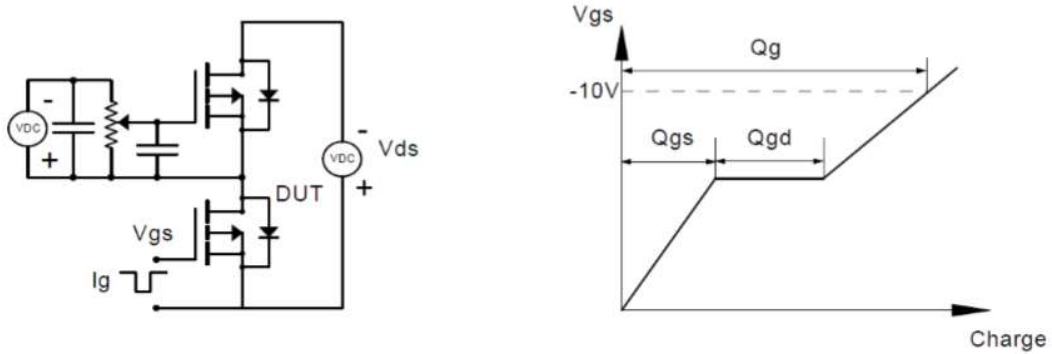
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-20	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = -20V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 12V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate threshold voltage <sup>(3)</sup>	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	0.35	0.6	1.0	V
Drain-source on-resistance <sup>(3)</sup>	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -20A$	-	5.8	7.0	m $\Omega$
		$V_{GS} = -2.5V, I_D = -10A$	-	7.0	9.0	
<b>Dynamic characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -10V, V_{GS} = 0V, f = 1MHz$	-	3600	-	pF
Output Capacitance	$C_{oss}$		-	572	-	
Reverse Transfer Capacitance	$C_{rss}$		-	440	-	
<b>Switching characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -10V, I_D = -15A, R_L = 0.5\Omega$ $V_{GS} = -4.5V, R_G = 3\Omega$	-	18	-	ns
Turn-on rise time	$t_r$		-	43	-	
Turn-off delay time	$t_{d(off)}$		-	85	-	
Turn-off fall time	$t_f$		-	23	-	
Total Gate Charge	$Q_g$	$V_{DS} = -10V, I_D = -20A,$ $V_{GS} = -4.5V$	-	55	-	nC
Gate-Source Charge	$Q_{gs}$		-	10	-	
Gate-Drain Charge	$Q_{gd}$		-	15	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage <sup>(2)</sup>	$V_{DS}$	$V_{GS} = 0V, I_S = -20A$	-	-	-1.2	V
Diode Forward current <sup>(3)</sup>	$I_S$		-	-	-60	A

**Notes:**

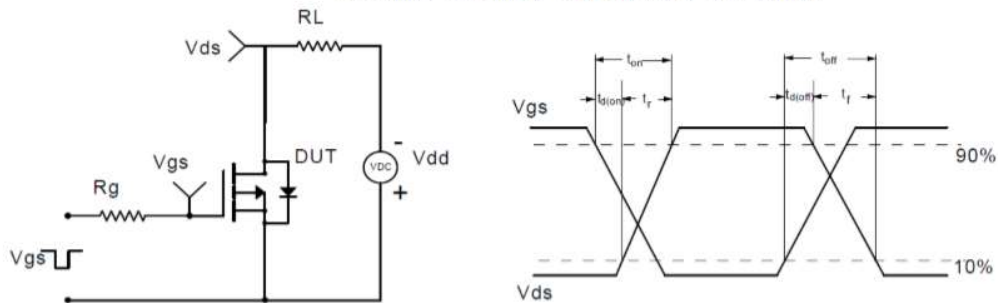
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
3. Surface Mounted on FR4 Board,  $t \leq 10$  sec

**Test Circuit**

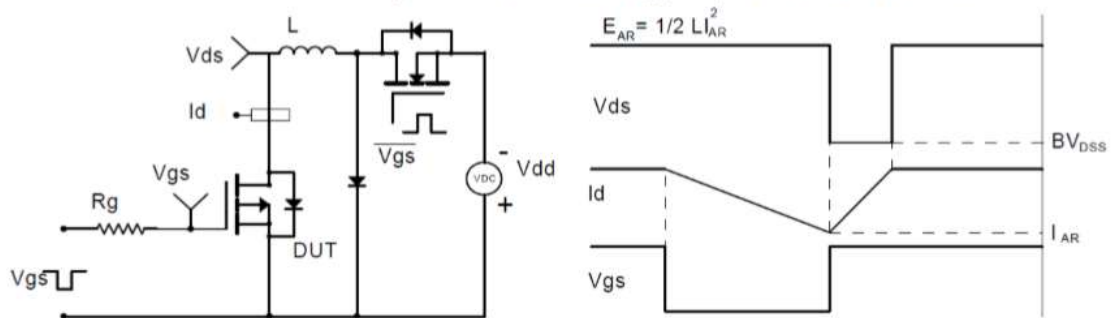
Gate Charge Test Circuit & Waveform



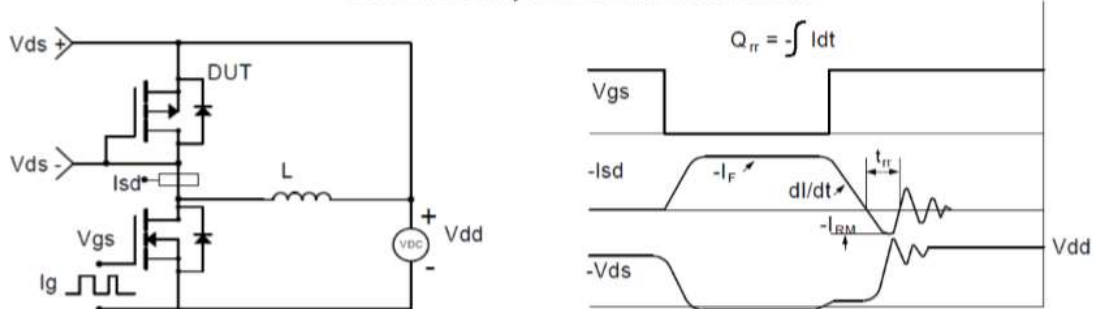
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



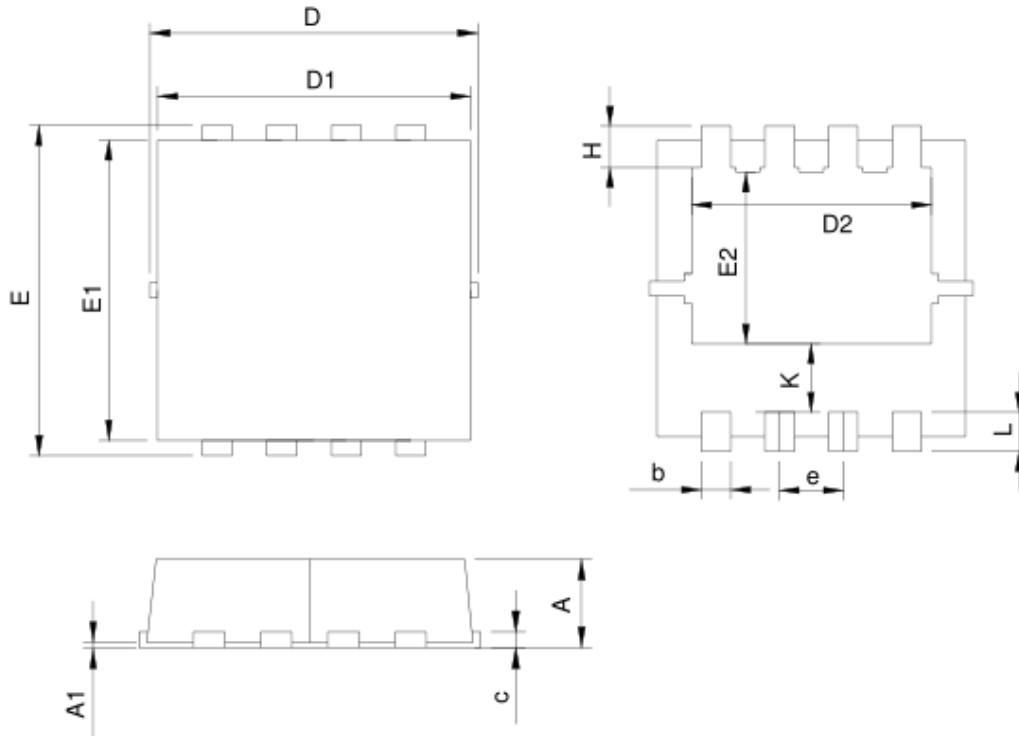
Diode Recovery Test Circuit & Waveforms



# AP60P20Q

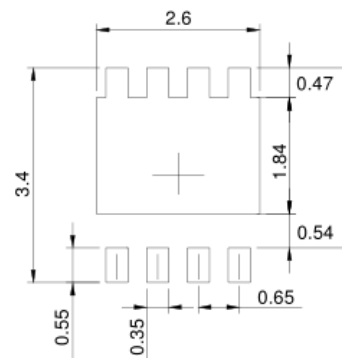
P-Channel Enhancement Mosfet

### PDFN3X3-8L Package Information



Symbol	DFN3.3x3.3-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.00	0.028	0.039
A1	0.00	0.05	0.000	0.002
b	0.25	0.35	0.010	0.014
c	0.14	0.20	0.006	0.008
D	3.10	3.50	0.122	0.138
D1	3.05	3.25	0.120	0.128
D2	2.35	2.55	0.093	0.100
E	3.10	3.50	0.122	0.138
E1	2.90	3.10	0.114	0.122
E2	1.64	1.84	0.065	0.072
e	0.65 BSC		0.026 BSC	
H	0.32	0.52	0.013	0.020
K	0.59	0.79	0.023	0.031
L	0.25	0.55	0.010	0.022

### RECOMMENDED LAND PATTERN



UNIT: mm