

## N-Channel 30V(D-S) MOSFET

Product summary		
$V_{DS}$	30	V
$R_{DS(ON)}$ (at $V_{GS}=10V$ ) Typ.	6.6	m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) Typ.	11	m $\Omega$
$I_D(T_C=25^{\circ}C)$	51	A

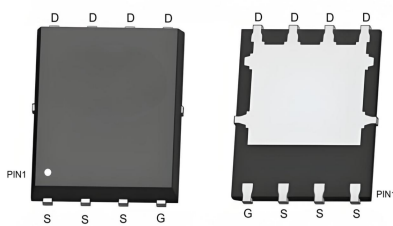
### Features

- Advanced Trench Technology
- Low  $R_{DS(ON)}$

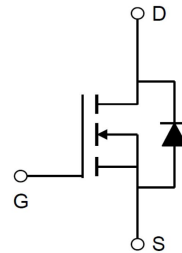
### Applications

- Load switching
- PWM Applications
- Power Management

### Pin Configuration



PDFN5X6-8L



### Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECAP51N03A	PDFN5X6-8L	13"	3000pcs

### Absolute Maximum Ratings (at $T_A=25^{\circ}C$ Unless Otherwise Noted)

Symbol	Parameter		Rating	Units
$V_{DS}$	Drain-Source Voltage		30	V
$V_{GS}$	Gate-Source Voltage		$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C=25^{\circ}C$	51	A
		$T_C=100^{\circ}C$	30	A
$I_{DM}$	Pulse Drain Current Tested <sup>A</sup>		137	A
$E_{AS}$	Single Pulse Avalanche Energy <sup>B</sup>		39	mJ
$P_D$	Power Dissipation @ $T_C=25^{\circ}C$		48	W
$T_J, T_{STG}$	Junction and Storage Temperature Range		-55 to +150	$^{\circ}C$

### Thermal Characteristics

Symbol	Parameter	Typical	Units
$R_{\theta JC}$	Thermal Resistance-Junction to case max	2.6	$^{\circ}C/W$

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

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
<b>Static Parameters</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	--	--	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V$	--	--	1	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	--	--	$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance <sup>C</sup>	$V_{GS}=10V, I_D=20A$	--	6.6	8.6	m $\Omega$
		$V_{GS}=4.5V, I_D=15A$	--	11	15	m $\Omega$
$V_{SD}$	Diode Forward Voltage	$I_S=1A, V_{GS}=0V$	--	--	1.2	V
<b>Dynamic Parameters <sup>D</sup></b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=15V$ $f=1\text{MHz}$	--	1116	--	pF
$C_{oss}$	Output Capacitance		--	187	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	152	--	pF
$Q_g$	Total Gate Charge	$V_{DS}=15V, I_D=15A$ $V_{GS}=10V$	--	13.3	--	nC
$Q_{gs}$	Gate-Source Charge		--	3.1	--	nC
$Q_{gd}$	Gate-Drain Charge		--	5	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DS}=15V$ $R_{GEN}=3\Omega,$ $I_D=30A,$ $V_{GS}=10V$	--	15	--	ns
$t_r$	Turn-on Rise Time		--	19	--	ns
$t_{D(off)}$	Turn-off Delay Time		--	35	--	ns
$t_f$	Turn-off Fall Time		--	21	--	ns
$t_{rr}$	Reverse recovery time	$I_F=20A,$ $di/dt=100\text{ A/uS}$	--	14	--	ns
$Q_{rr}$	Reverse recovery charge		--	4.1	--	nC

A. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

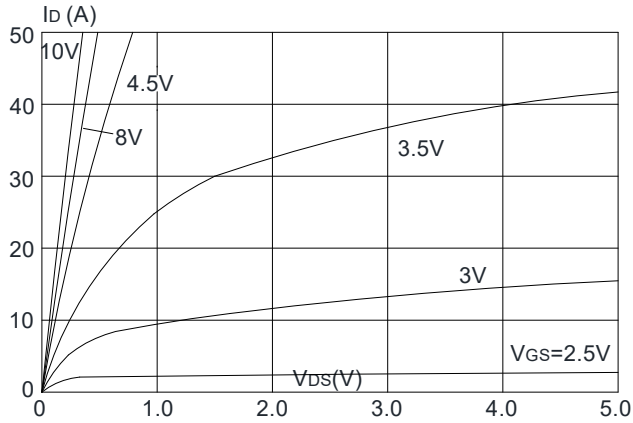
B. EAS condition:  $T_J=25^\circ\text{C}$ ,  $R_G=25\Omega$ ,  $V_{DD}=15V$ ,  $V_G=10V$ ,  $L=0.5\text{mH}$ ,  $I_{AS}=12.6A$ .

C. Pulse Test: Pulse Width $\leq 300\mu\text{s}$ , Duty Cycle $\leq 0.5\%$ .

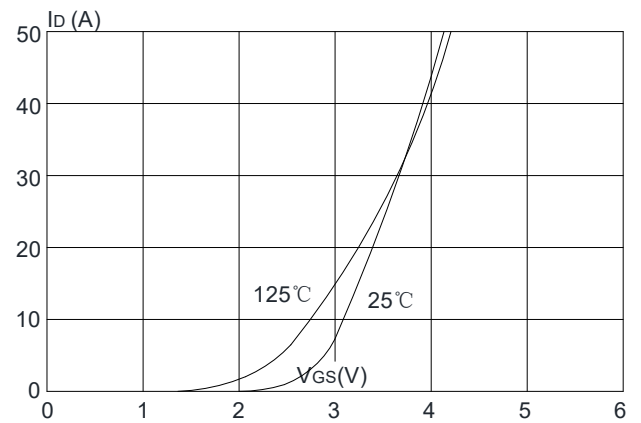
D. Guaranteed by design, not subject to production testing.

## Typical Characteristics

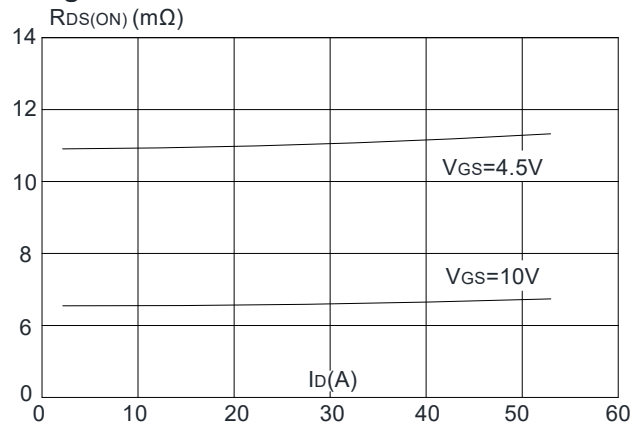
**Figure 1: Output Characteristics**



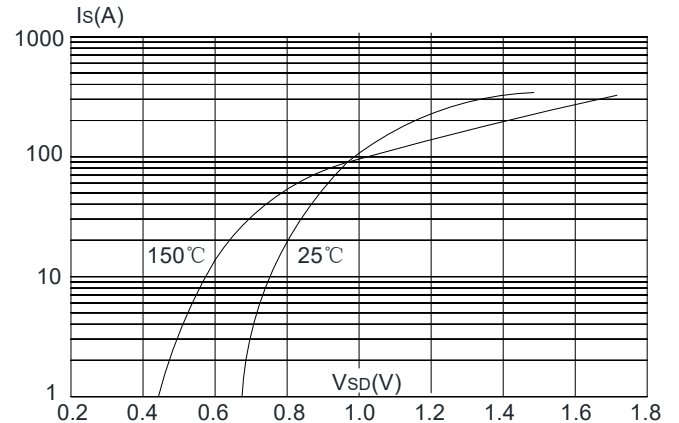
**Figure 2: Typical Transfer Characteristics**



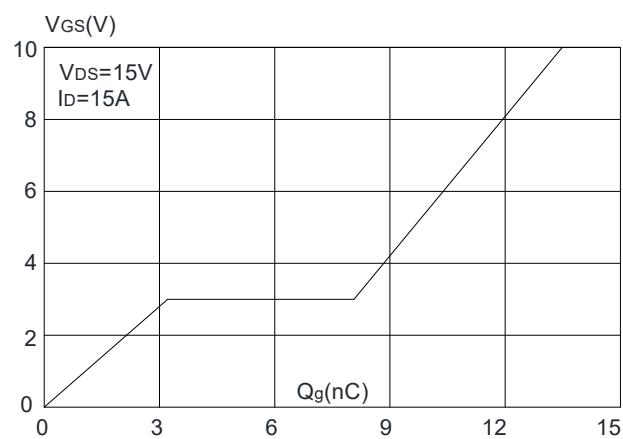
**Figure 3: On-resistance vs. Drain Current**



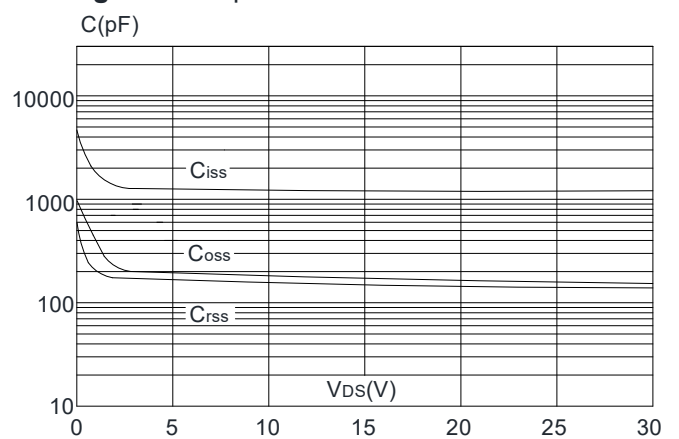
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

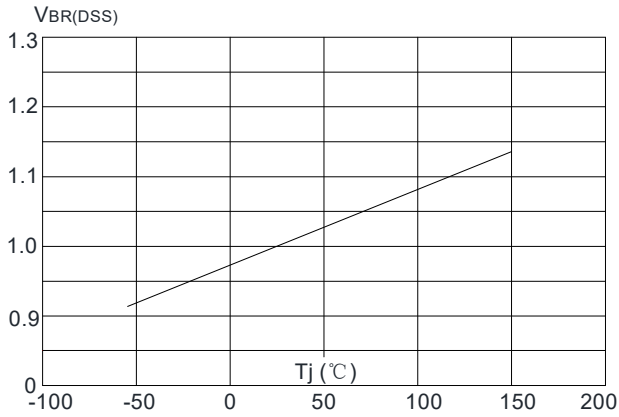


**Figure 6: Capacitance Characteristics**

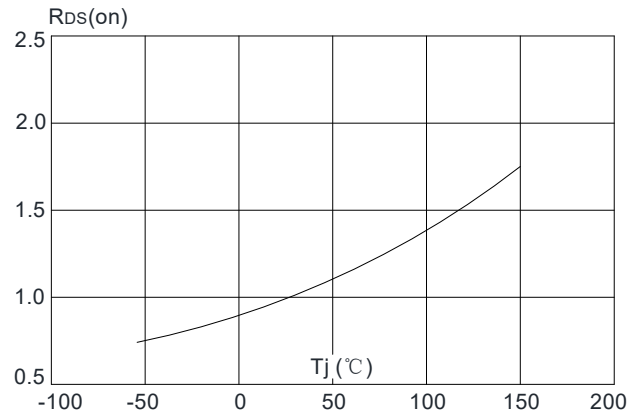


## Typical Characteristics

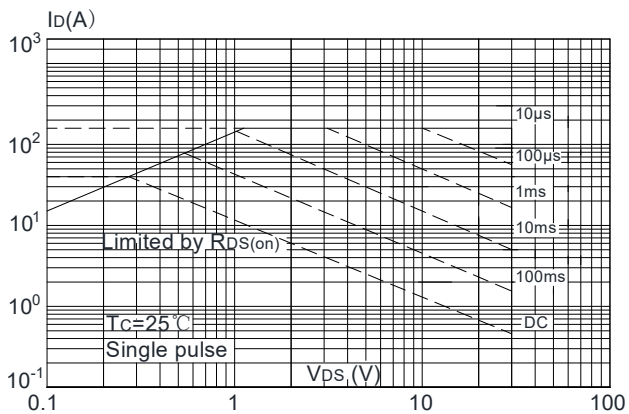
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



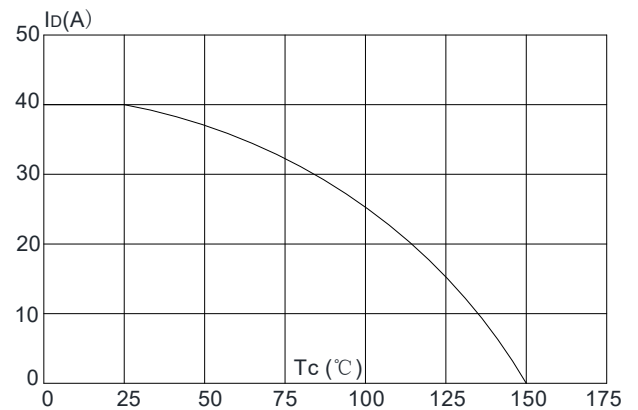
**Figure 8:** Normalized on Resistance vs. Junction Temperature



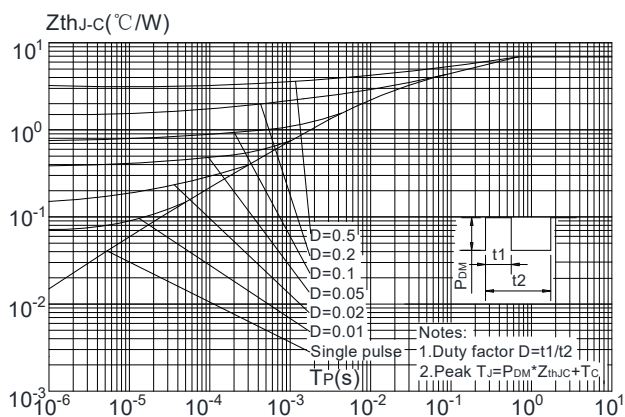
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



## Test Circuit

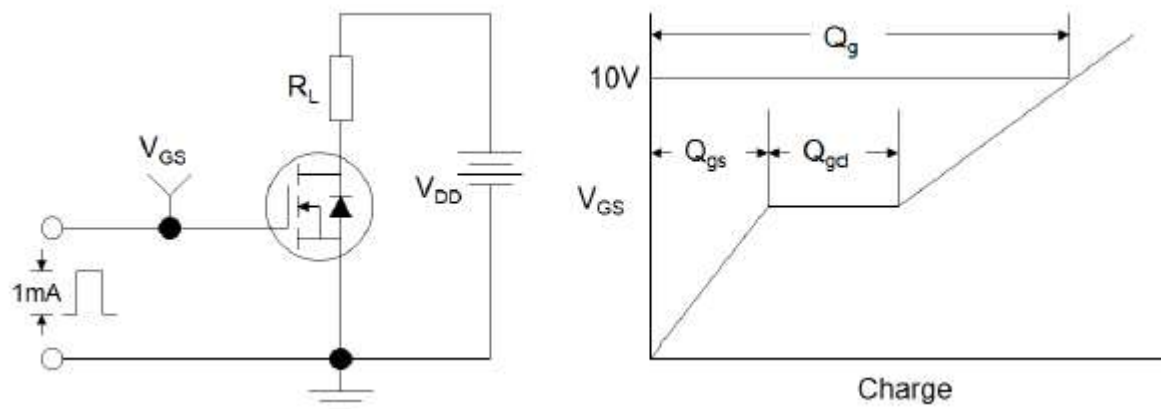


Figure1:Gate Charge Test Circuit & Waveform

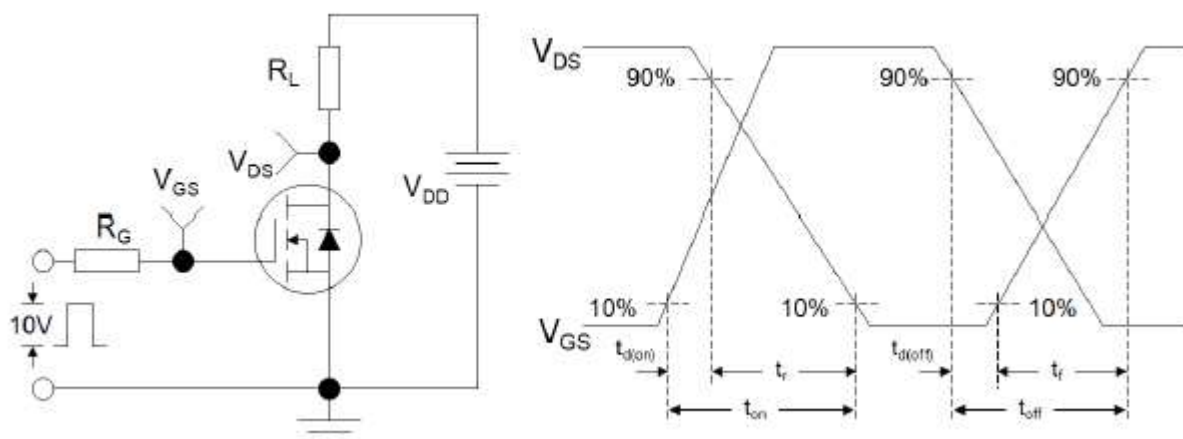


Figure 2: Resistive Switching Test Circuit & Waveforms

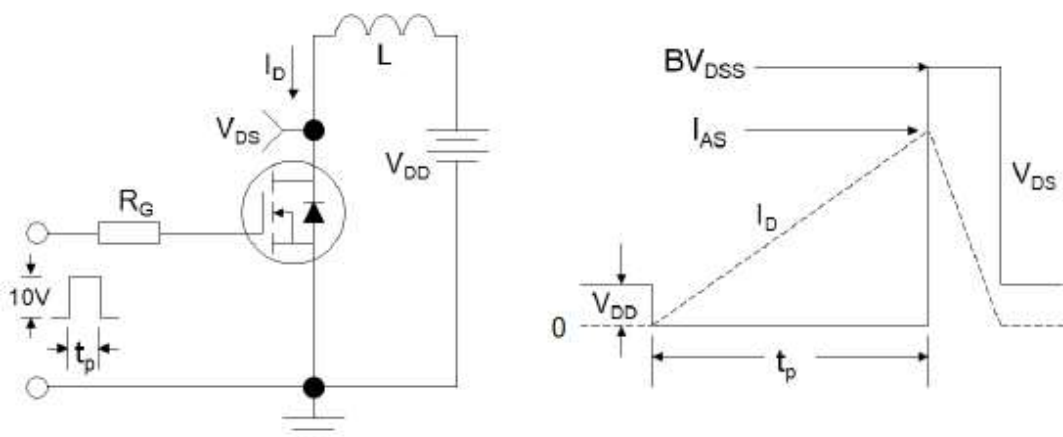
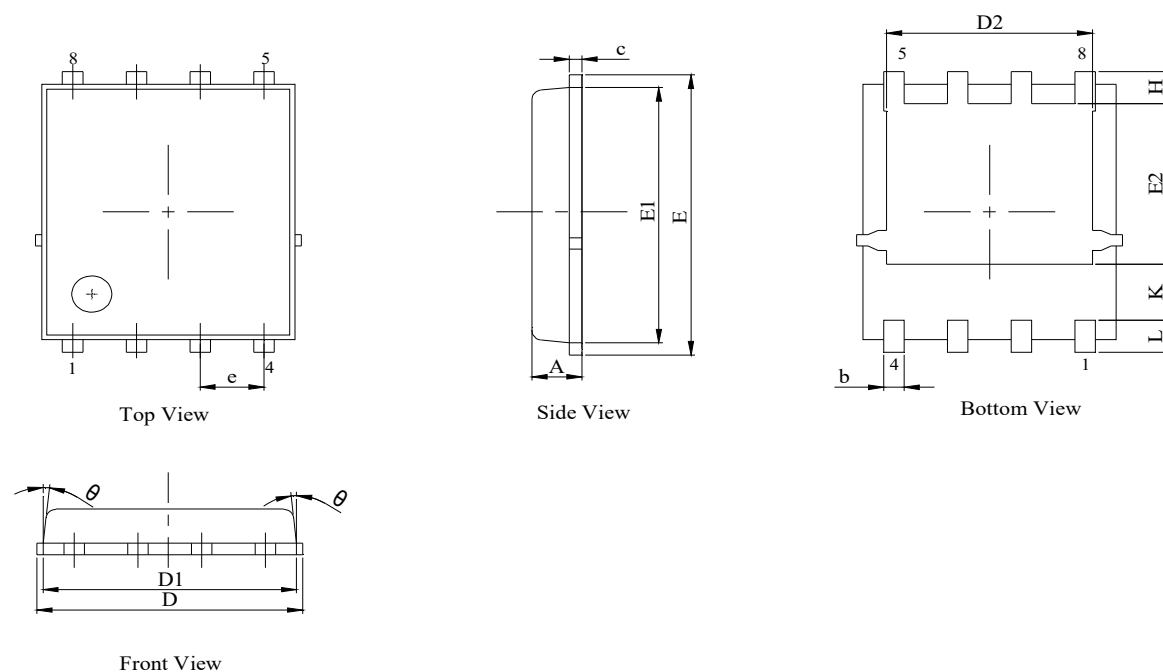


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

## PDFN5X6-8L Package Information (unit:mm)



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
b	0.31	0.41	0.51
c	0.20	0.25	0.30
D	5.00	5.20	5.40
D1	4.95	5.05	5.15
D2	4.00	4.10	4.20
E	6.05	6.15	6.25
E1	5.50	5.60	5.70
E2	3.42	3.53	3.63
e	1.27BSC		
H	0.60	0.70	0.80
L	0.50	0.70	0.80
$\theta$	-	-	10°