

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

Product summary		
$V_{DS}$	30	V
$R_{DS(ON)}$ (at $V_{GS}=10V$ ) Typ.	4.9	m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) Typ.	7.9	m $\Omega$
$I_D(T_C=25^{\circ}C)$	45	A

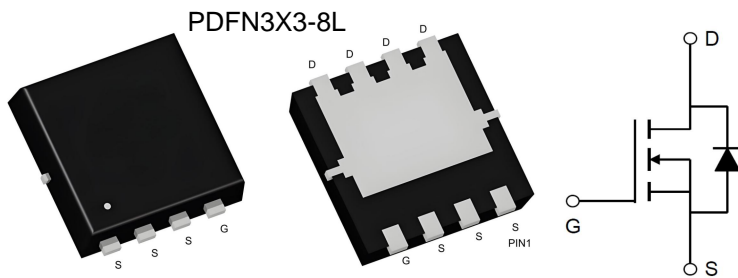
### Features

- Advanced Trench Technology
- Low Gate Charge

### Applications

- Load switching
- PWM Applications

### Pin Configuration



### Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECAL45N03A	PDFN3X3-8L	13"	5000pcs

### 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	$T_C=25^{\circ}C$	45	A
		$T_C=100^{\circ}C$	27	A
$I_{DM}$	Pulse Drain Current <sup>A</sup>		169	A
$E_{AS}$	Single Pulse Avalanche Energy <sup>B</sup>		56	mJ
$P_D$	Power Dissipation @ $T_C=25^{\circ}C$		39	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	3.2	$^{\circ}C/W$

**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>	$V_{GS}=10V, I_D=20A$	--	4.9	6.5	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	--	7.9	12.5	m $\Omega$
$V_{SD}$	Diode Forward Voltage	$I_S=1A, V_{GS}=0V$	--	--	1.2	V
$I_S$	Diode Forward Current	$T_C=25^\circ\text{C}$	--	--	45	A
<b>Dynamic Parameters <sup>D</sup></b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=15V$ $f=1\text{MHz}$	--	1614	--	pF
$C_{oss}$	Output Capacitance		--	245	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	215	--	pF
$Q_g$	Total Gate Charge	$V_{DS}=15V, I_D=30A$ $V_{GS}=10V$	--	33.7	--	nC
$Q_{gs}$	Gate-Source Charge		--	8.5	--	nC
$Q_{gd}$	Gate-Drain Charge		--	7.5	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DS}=15V$ $R_{GEN}=3\Omega,$ $I_D=30A,$ $V_{GS}=10V$	--	7.5	--	ns
$t_r$	Turn-on Rise Time		--	14.5	--	ns
$t_{D(off)}$	Turn-off Delay Time		--	35.2	--	ns
$t_f$	Turn-off Fall Time		--	9.6	--	ns

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

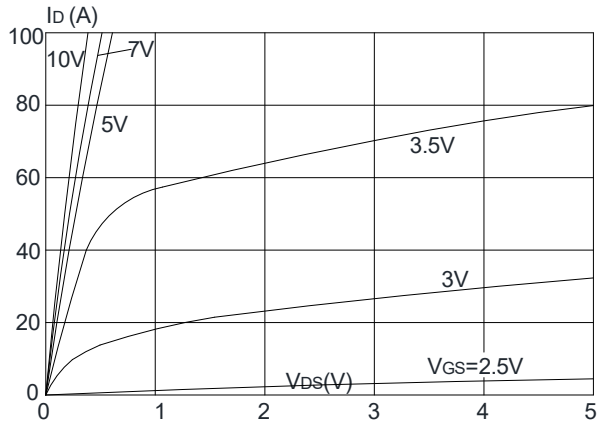
B. EAS condition:  $T_J=25^\circ\text{C}$ ,  $R_G=25\Omega$ ,  $V_{DD}=15V$ ,  $V_G=10V$ ,  $L=0.5\text{mH}$ ,  $I_{AS}=15A$ .

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

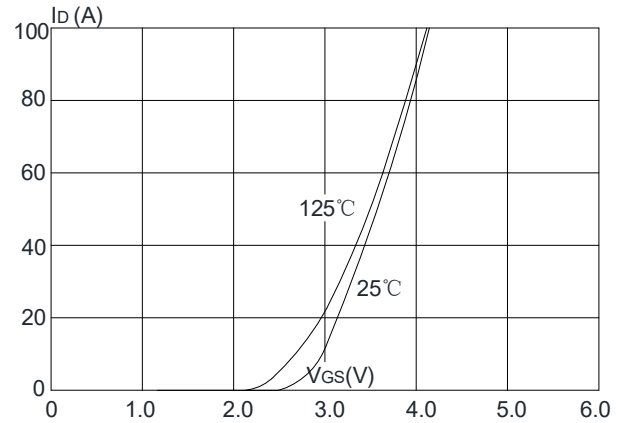
D. Guaranteed by design, not subject to production testing.

## Typical Characteristics

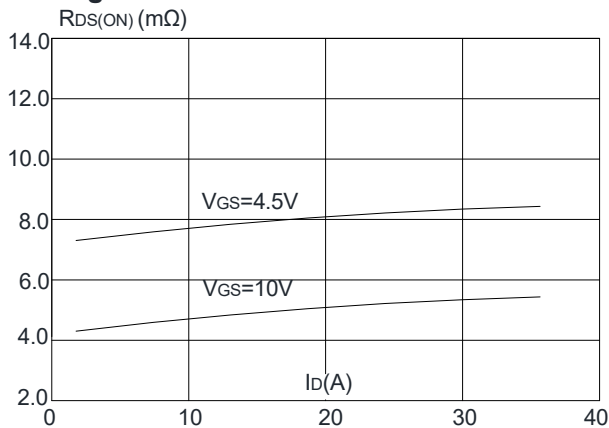
**Figure1: Output Characteristics**



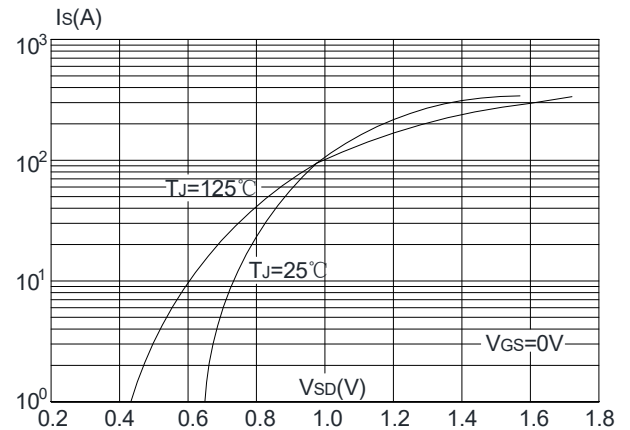
**Figure 2: Typical Transfer Characteristics**



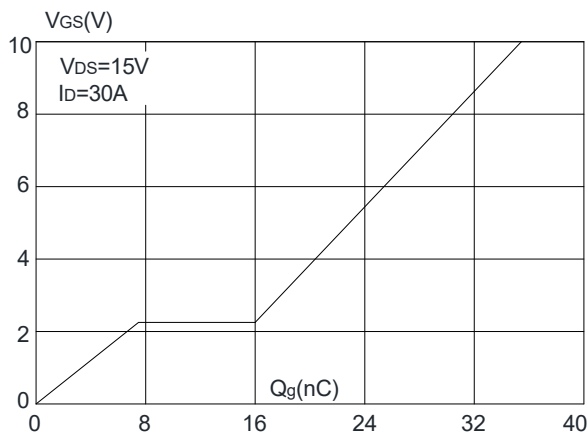
**Figure 3: On-resistance vs. Drain Current**



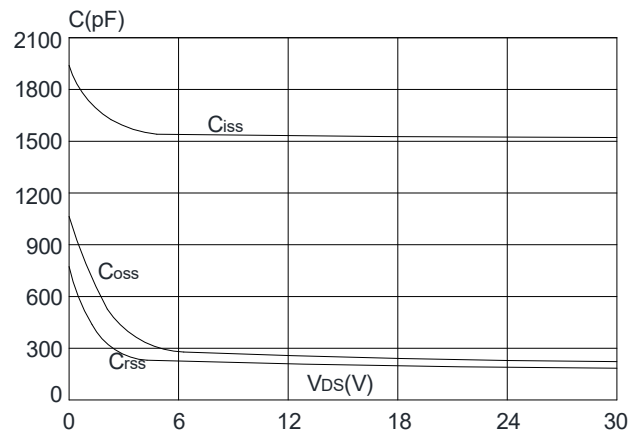
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

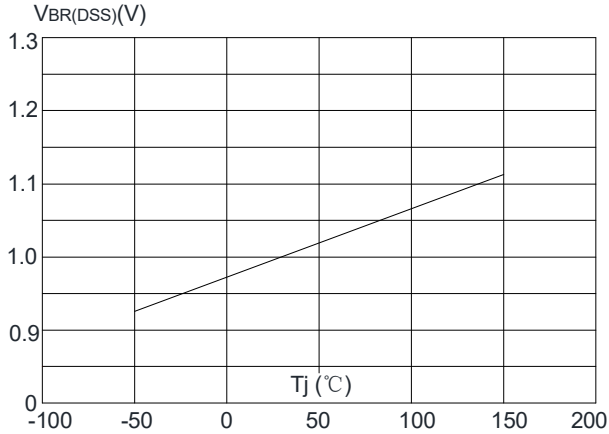


**Figure 6: Capacitance Characteristics**

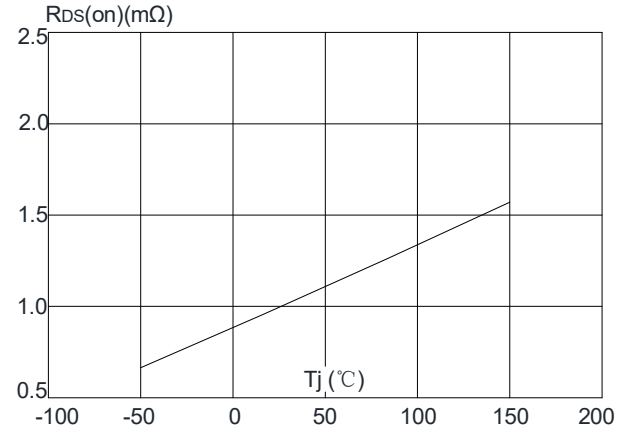


## Typical Characteristics

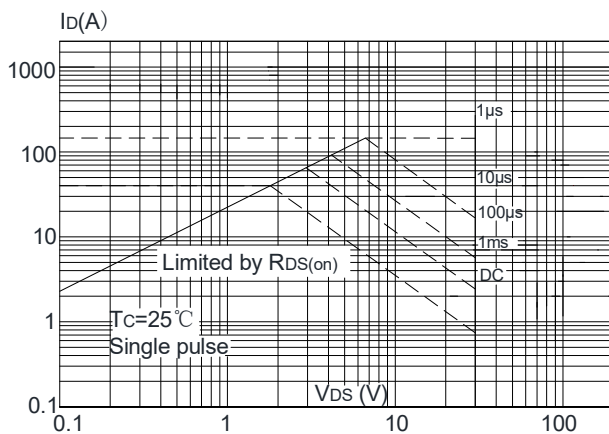
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



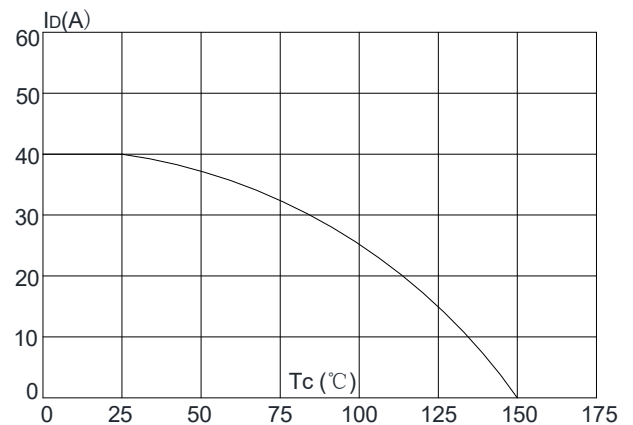
**Figure 8:** Normalized on Resistance vs. Junction Temperature



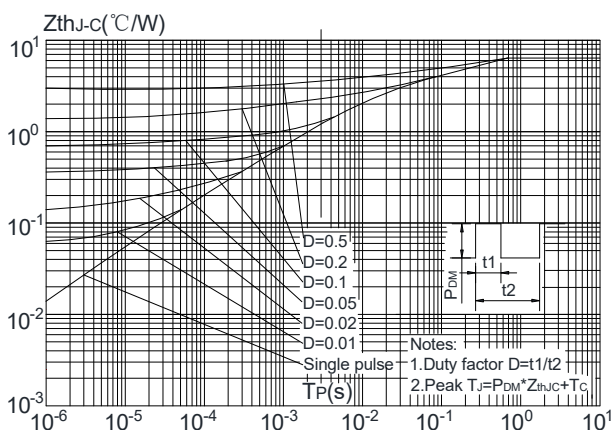
**Figure 9:** Maximum Safe Operating Area



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



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



## Test Circuit

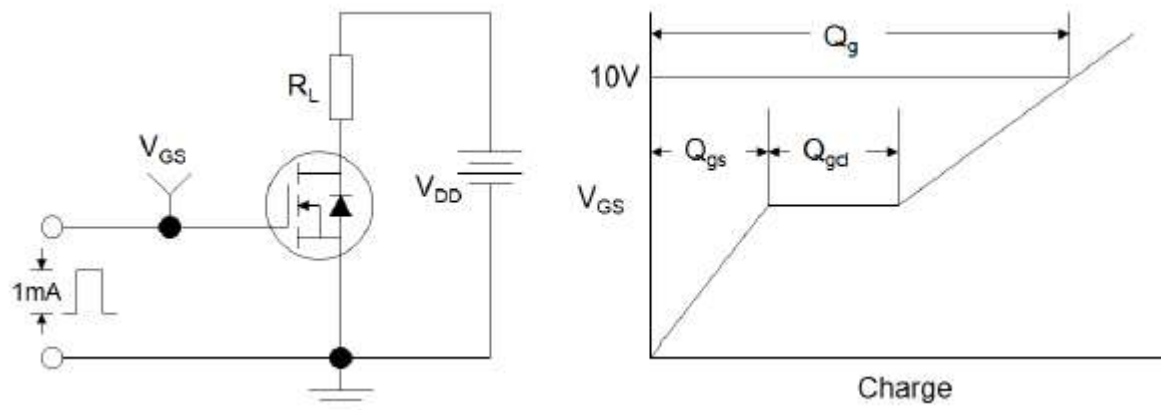


Figure1:Gate Charge Test Circuit & Waveform

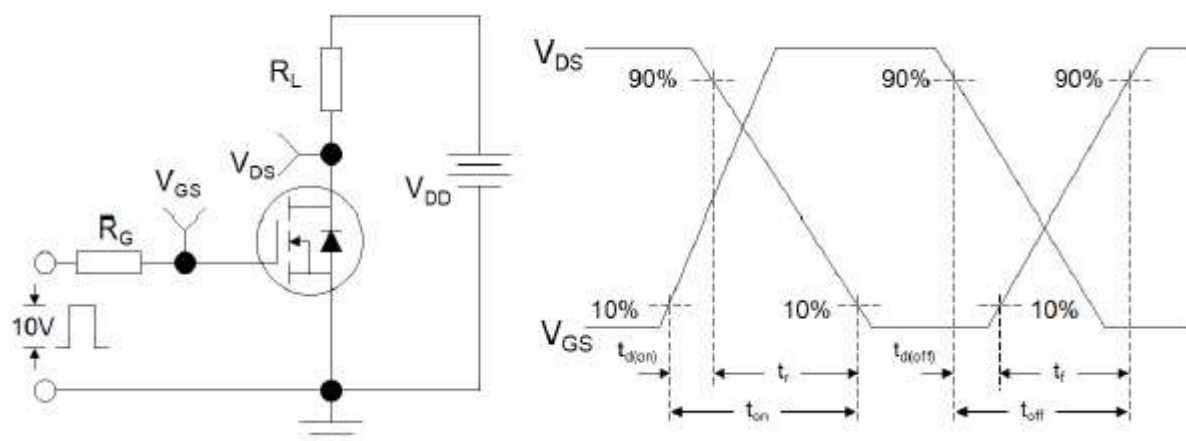


Figure 2: Resistive Switching Test Circuit & Waveforms

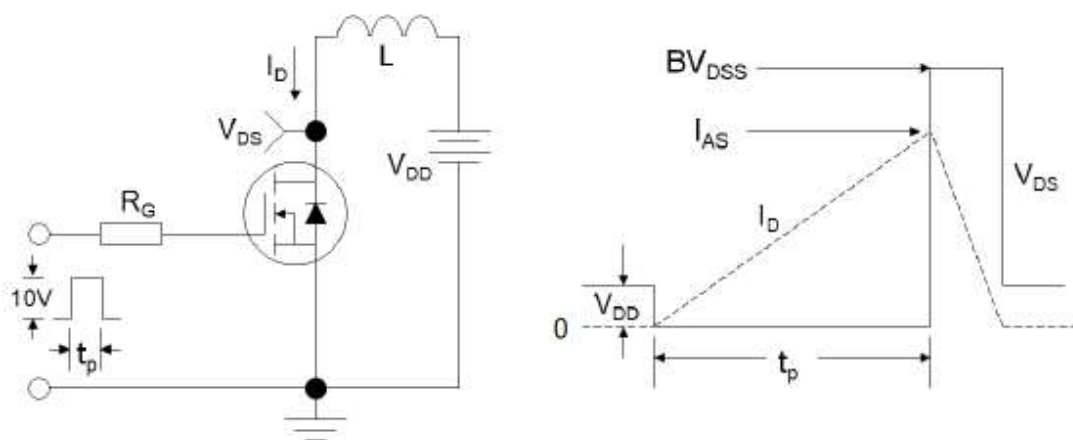
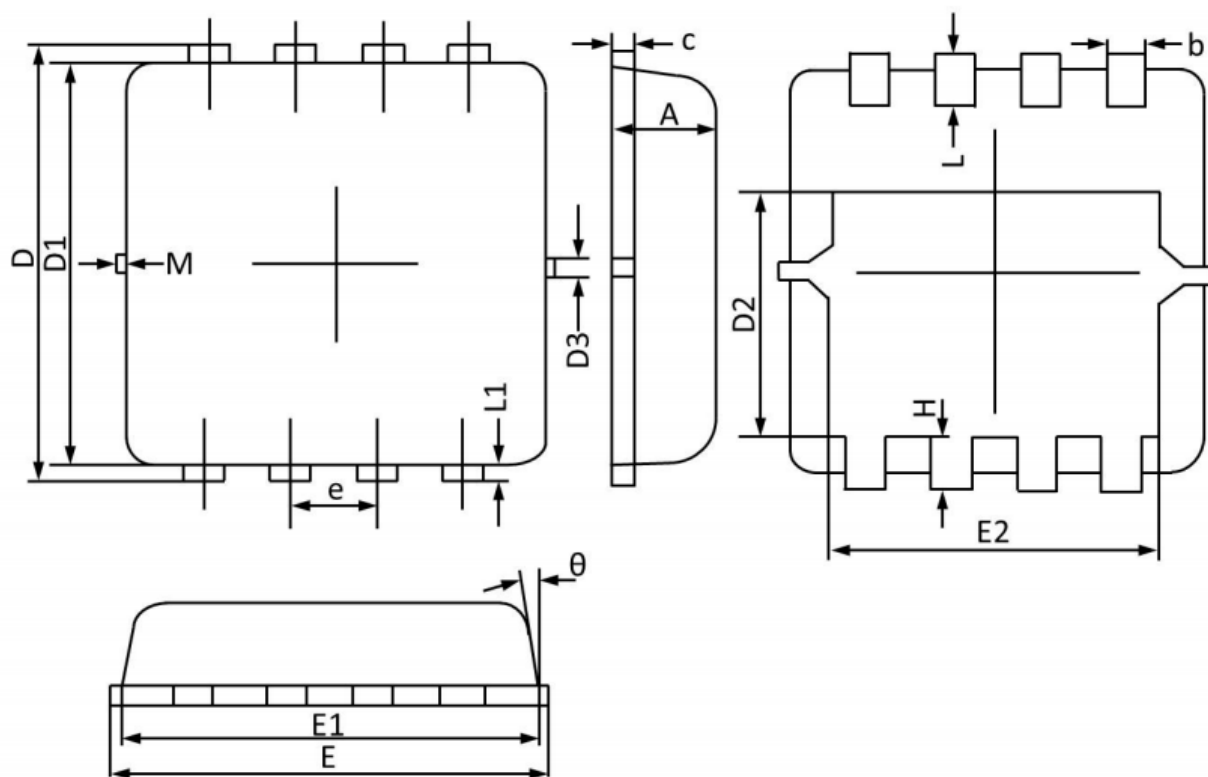


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

## PDFN3X3-8L Package Information



## DIMENSIONS

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.70	0.75	0.80	b	0.25	0.30	0.35
C	0.10	0.15	0.25	D	3.25	3.35	3.45
D1	3.00	3.10	3.20	D2	1.78	1.88	1.98
D3	--	0.13	--	E	3.20	3.30	3.40
E1	3.00	3.15	3.20	E2	2.39	2.49	2.59
e	0.65BSC			H	0.30	0.39	0.50
L	0.30	0.40	0.50	L1	--	0.13	--
$\theta$	--	10°	12°	M	*	*	0.15