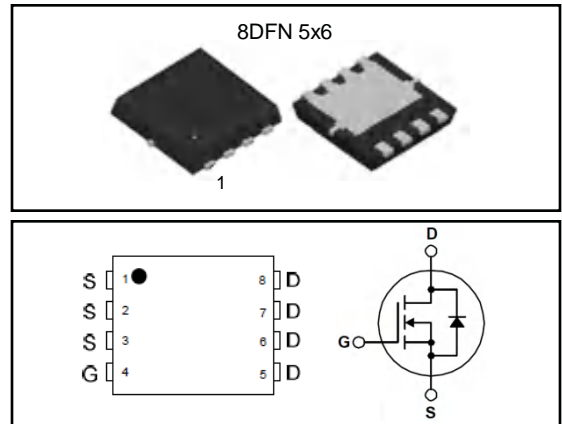


# HRLF80N06K

## 60V N-Channel Trench MOSFET

### FEATURES

- ❑  $BV_{DSS} = 60\text{ V}$
- ❑  $I_D = 70\text{ A}$
- ❑ Unrivalled Gate Charge : 100 nC (Typ.)
- ❑ Lower  $R_{DS(ON)}$  : 6.3 m $\Omega$  (Typ.) @  $V_{GS}=10\text{V}$
- ❑ Lower  $R_{DS(ON)}$  : 7.5 m $\Omega$  (Typ.) @  $V_{GS}=4.5\text{V}$
- ❑ 100% Avalanche Tested



### Absolute Maximum Ratings $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Value	Units
$V_{DSS}$	Drain-Source Voltage	60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current	$T_C = 25^\circ\text{C}$	70 A
		$T_C = 100^\circ\text{C}$	44 A
$I_{DM}$	Pulsed Drain Current (Note 1)	150	A
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	220	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	69 W
		$T_A = 25^\circ\text{C}$	2.0 W
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

### Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	1.8	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Junction-to-Ambient (steady state)	--	62	$^\circ\text{C}/\text{W}$

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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**On Characteristics**

$V_{GS}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	1.0	--	2.4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$	--	6.3	8	m $\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$	--	7.5	10	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 5\text{ V}, I_D = 30\text{ A}$	--	50	--	S

**Off Characteristics**

$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250 \mu\text{A}$	60	--	--	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	$\mu\text{A}$
		$V_{DS} = 48\text{ V}, T_J = 125^\circ\text{C}$	--	--	100	$\mu\text{A}$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	--	--	$\pm 100$	nA

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	--	4200	--	pF
$C_{oss}$	Output Capacitance		--	380	--	pF
$C_{riss}$	Reverse Transfer Capacitance		--	300	--	pF
$R_g$	Gate Resistance	$V_{GS} = 0\text{ V}, V_{DS} = 0\text{ V}, f = 1\text{ MHz}$	--	1.6	--	$\Omega$

**Switching Characteristics**

$t_{d(on)}$	Turn-On Time	$V_{DS} = 30\text{ V}, I_D = 30\text{ A}, R_G = 6\ \Omega$	--	30	--	ns
$t_r$	Turn-On Rise Time		--	55	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	200	--	ns
$t_f$	Turn-Off Fall Time		--	50	--	ns
$Q_g$	Total Gate Charge	$V_{DS} = 48\text{ V}, I_D = 30\text{ A}, V_{GS} = 10\text{ V}$	--	100	--	nC
$Q_{gs}$	Gate-Source Charge		--	20	--	nC
$Q_{gd}$	Gate-Drain Charge		--	25	--	nC

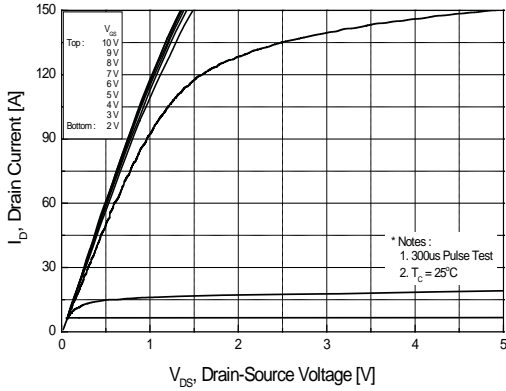
**Source-Drain Diode Maximum Ratings and Characteristics**

$I_S$	Continuous Source-Drain Diode Forward Current	--	--	70	A	
$I_{SM}$	Pulsed Source-Drain Diode Forward Current	--	--	150		
$V_{SD}$	Source-Drain Diode Forward Voltage	$I_S = 30\text{ A}, V_{GS} = 0\text{ V}$	--	--	1.3	V
$t_{rr}$	Reverse Recovery Time	$I_S = 30\text{ A}, V_{GS} = 0\text{ V}, di_F/dt = 100\text{ A}/\mu\text{s}$	--	70	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	100	--	nC

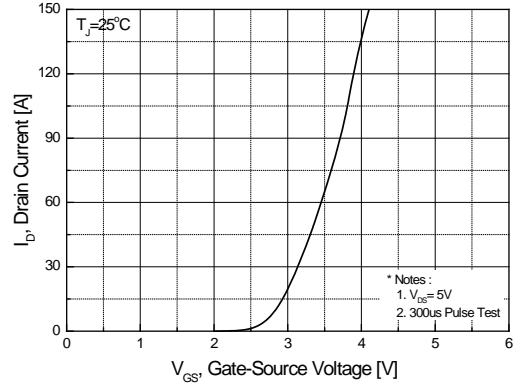
**Notes :**

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2.  $L=1\text{mH}, I_{AS}=16\text{A}, V_{DD}=25\text{V}, R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$

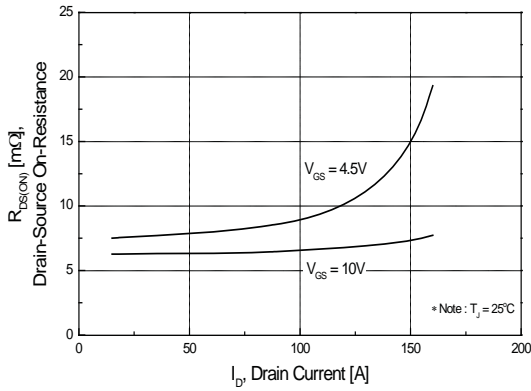
## Typical Characteristics



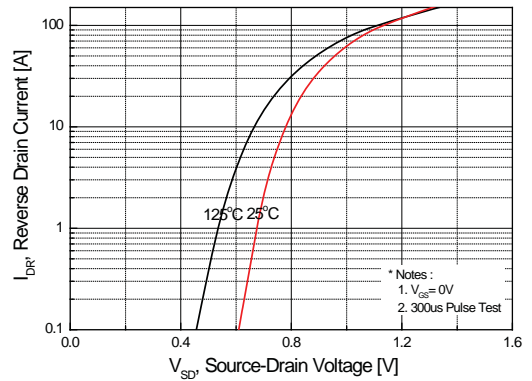
**Figure 1. On Region Characteristics**



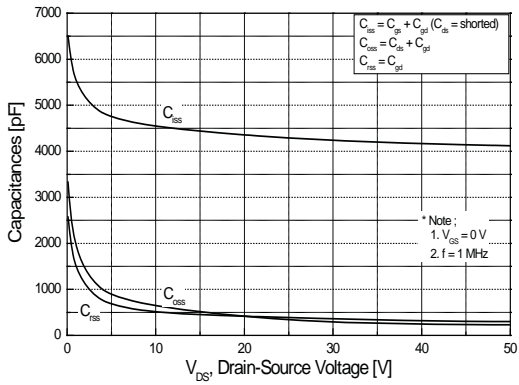
**Figure 2. Transfer Characteristics**



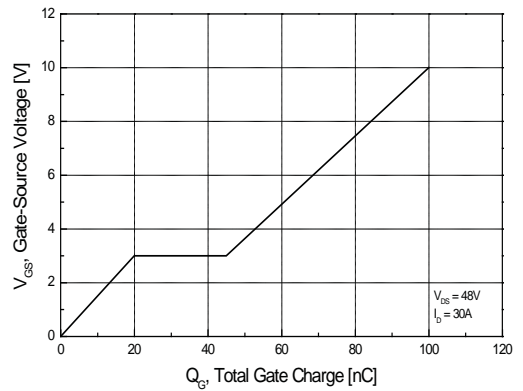
**Figure 3. On Resistance Variation vs Drain Current and Gate Voltage**



**Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature**

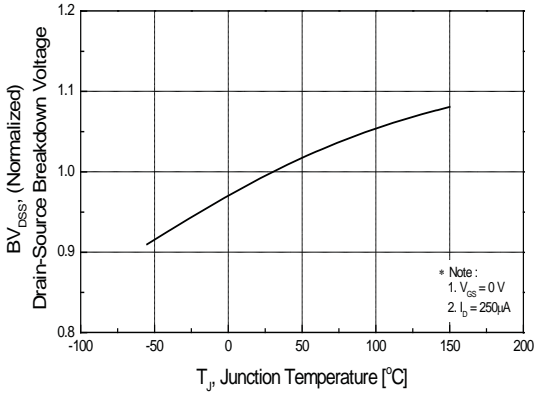


**Figure 5. Capacitance Characteristics**

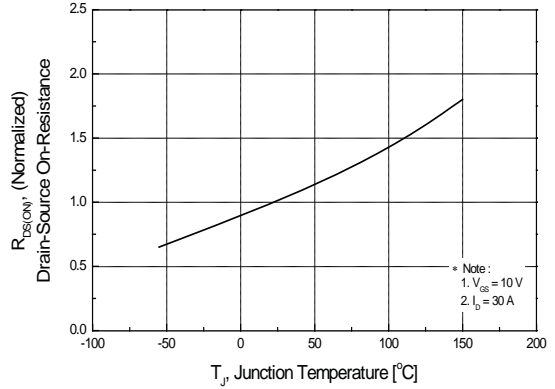


**Figure 6. Gate Charge Characteristics**

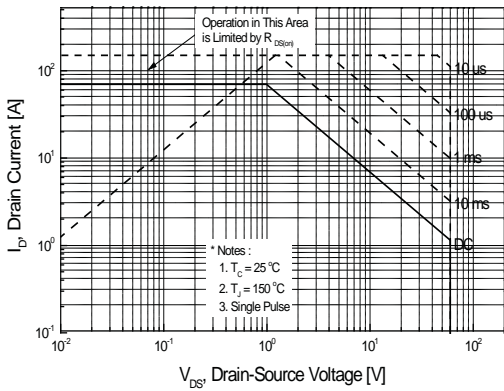
**Typical Characteristics (continued)**



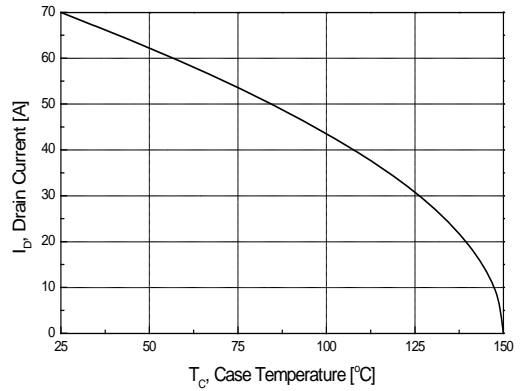
**Figure 7. Breakdown Voltage Variation vs Temperature**



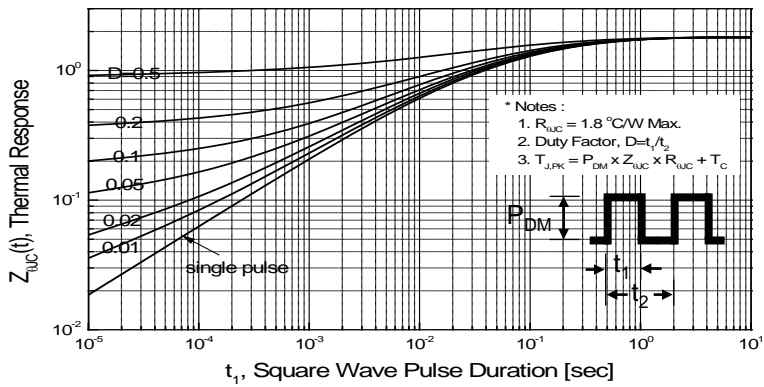
**Figure 8. On-Resistance Variation vs Temperature**



**Figure 9. Maximum Safe Operating Area**



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



**Figure 11. Transient Thermal Response Curve**

**Fig 12. Gate Charge Test Circuit & Waveform**



**Fig 13. Resistive Switching Test Circuit & Waveforms**



**Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms**

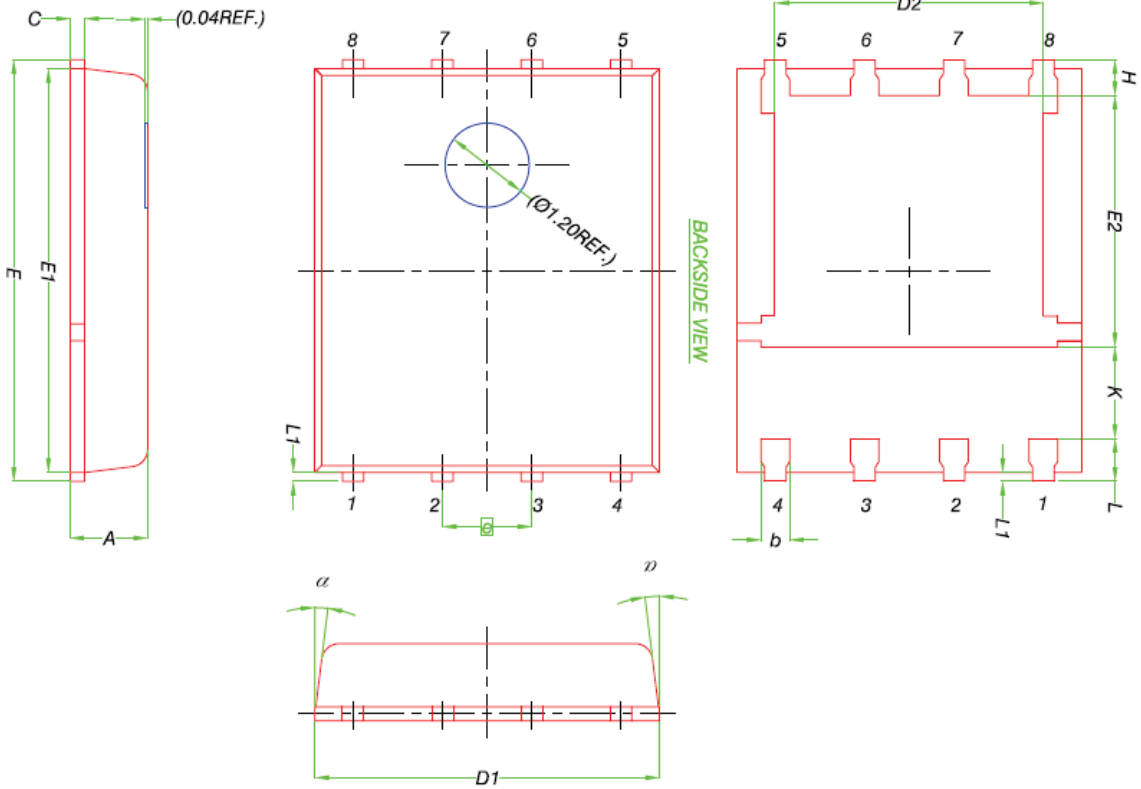


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Dimension

8DFN 5x6



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
$\square$ e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
$\alpha$	0°	-	12°

