

ICEK42NF60W N-Channel Enhancement Mode MOSFET

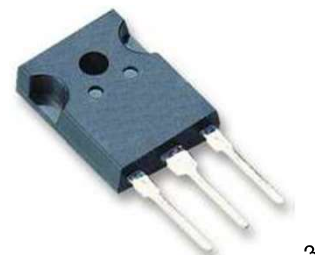
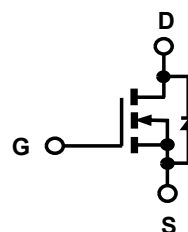
Features

- TO247-3L package
- Ultra Low $r_{DS(on)}$
- Ultra Low Gate Charge
- High dv/dt capability
- Ultra Fast Recovery Body Diode
- High Unclamped Inductive Switching (UIS) capability
- High peak current capability
- Increased transconductance performance
- Optimized design for high performance power systems



Lead Free

Product Summary			
I_D	$T_A=25^\circ\text{C}$	42A	Max
$V_{(BR)DSS}$	$I_D=1\text{mA}$	600V	Min
$r_{DS(on)}$	$V_{GS}=10\text{V}$	45m Ω	Typ
Q_g	$V_{DS}=400\text{V}$	95nC	Typ



TO247
1:G, 2:D,
3:S
(TO-247)

Maximum ratings^a at $T_j=25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current ^b	I_D	$T_c=25^\circ\text{C}$ $T_c=100^\circ\text{C}$	42 27	A
Pulsed drain current ^b	$I_{D, \text{pulse}}$	$T_c=25^\circ\text{C}$	150	A
Avalanche energy, single pulse	E_{AS}	$L = 10.8 \text{ mH}$, $V_{DD} = 100 \text{ V}$, $I_D=10\text{A}$, $R_G = 50 \Omega$	540	mJ
Avalanche current, repetitive ^b	I_{AR}	limited by $T_{j\text{max}}$	10	A
MOSFET dv/dt ruggedness	dv/dt	$V_{DS}=400\text{V}$, $I_D=42\text{A}$, $T_j=125^\circ\text{C}$	120	V/ns
Reverse diode dv/dt			70	
Gate source voltage	V_{GS}	Static	± 30	V
		AC ($f > 1\text{Hz}$)		
Power dissipation	P_{tot}	$T_c=25^\circ\text{C}$	250	W

^a Preliminary data sheet - Specifications subject to change.

^b limited by $T_{j\text{max}}$

^c when mounted on 1-inch square 2oz copper-clad FR-4

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

Thermal characteristics

Thermal resistance, junction-case ^{a,c}	R_{thJC}		-	-	0.5	°C/W
Thermal resistance, junction-ambient ^{a,c}	R_{thJA}	leaded	-	-	30	

Electrical characteristics at $T_j=25^{\circ}\text{C}$, unless otherwise specified

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$	600	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=1\text{ mA}$	3	3.8	5	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=600\text{ V}$, $V_{GS}=0\text{ V}$	-	-	10	μA
Gate source leakage current	I_{GSS}	$V_{GS}=\pm 30\text{ V}$, $V_{DS}=0\text{ V}$	-	-	± 100	nA
Drain-source on-state resistance	$r_{DS(on)}$	$V_{GS}=10\text{ V}$, $I_D=16\text{ A}$	-	45	58	mΩ
Gate resistance	R_G	$f=1\text{ MHz}$, open drain	-	6	-	Ω

Dynamic characteristics

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}$, $V_{DS}=400\text{ V}$, $f=1\text{ MHz}$	-	2890	-	pF
Reverse transfer capacitance	C_{rss}		-	15	-	
Output capacitance	C_{oss}		-	63	-	
Effective output capacitance, energy related	$C_{o(er)}$	$V_{GS}=0\text{ V}$, $V_{DS}=0\text{ to }400\text{ V}$	-	129	-	pF
Effective output capacitance, time related	$C_{o(tr)}$	$V_{GS}=0\text{ V}$, $V_{DS}=0\text{ to }400\text{ V}$, $I_D=\text{constant}$	-	990	-	pF
Turn-on delay time	$t_{d(on)}$	$V_{DS}=400\text{ V}$, $V_{GS}=13\text{ V}$, $I_D=16\text{ A}$, $R_G=3\Omega$ (External)	-	95	-	ns
Rise time	t_r		-	8	-	
Turn-off delay time	$t_{d(off)}$		-	83	-	
Fall time	t_f		-	8	-	

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

Gate charge characteristics

Gate to source charge	Q_{gs}	$V_{DS}=400\text{ V}, I_D=16\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	16	-	nC
Gate to drain charge	Q_{gd}		-	50	-	
Gate charge total	Q_g		-	95	-	

Reverse Diode

Continuous forward current	I_S	$V_{GS}=0\text{ V}$	-	-	42	A
Pulsed forward current	I_{SM}		-	-	150	A
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_S=I_{rm}$	-	0.95	-	V
Reverse recovery time	t_{rr}	$V_{RR}=400\text{ V}, I_S=I_{rm},$ $d_{iF}/dt=100\text{ A}/\mu\text{S}$	-	90	-	ns
Reverse recovery charge	Q_{rr}		-	0.8	-	μC
Peak reverse recovery current	I_{rm}		-	16	-	A

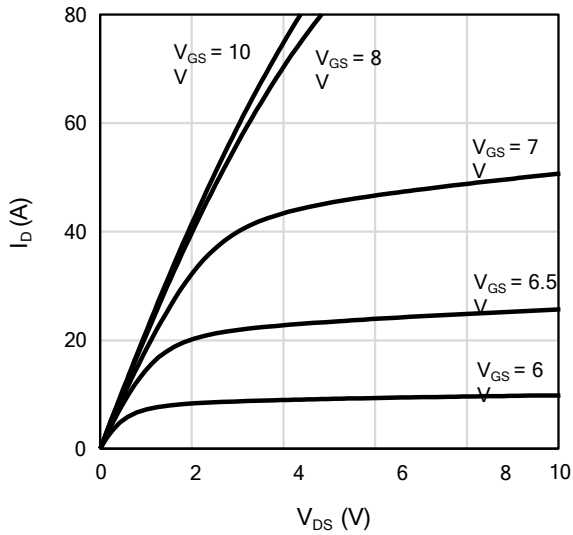


Figure 1: On-Region Characteristics

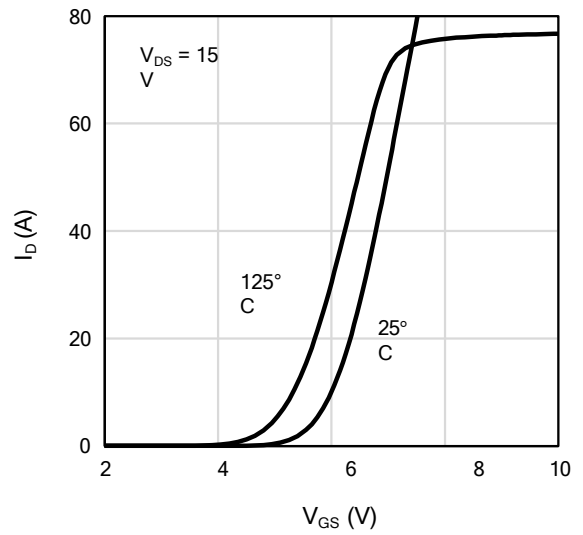


Figure 2: Transfer Characteristics

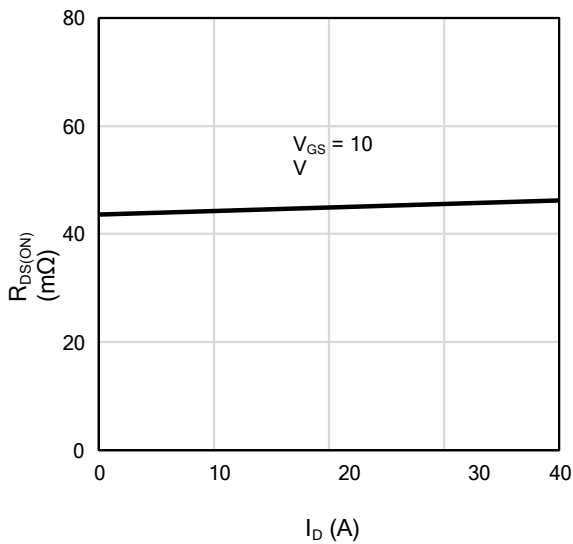


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

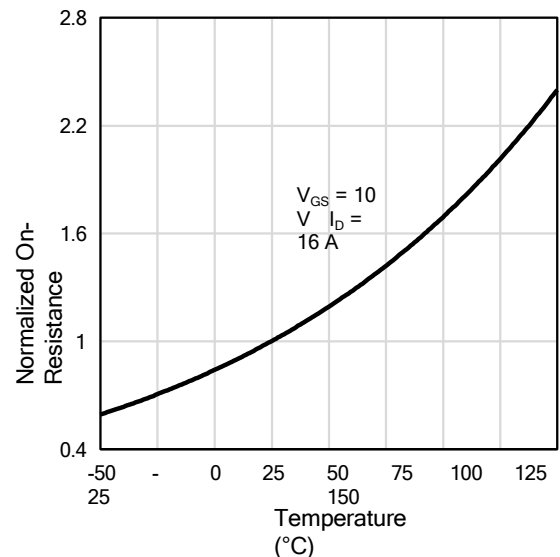


Figure 4: On-Resistance vs. Junction Temperature

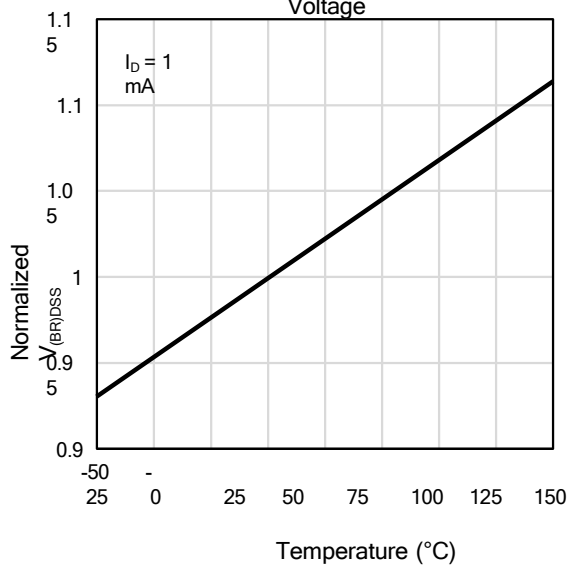


Figure 5: Breakdown Voltage vs. Junction Temperature

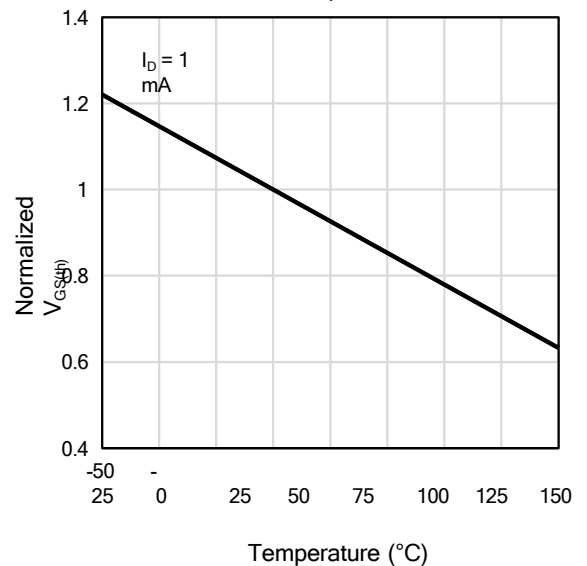


Figure 6: Threshold Voltage vs. Junction Temperature

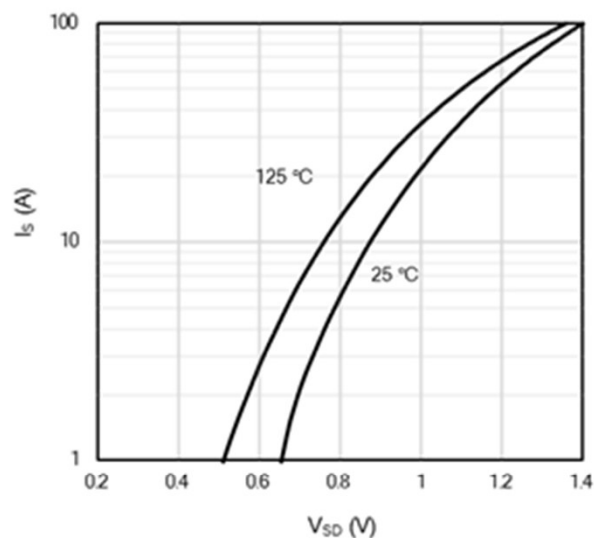


Figure 7: Body-Diode Characteristics

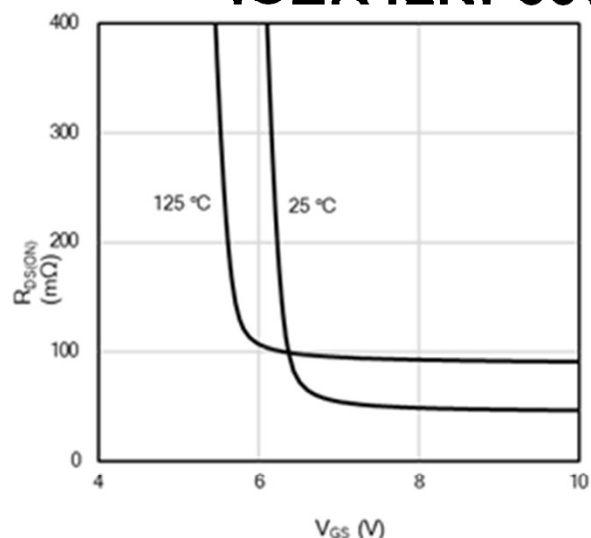


Figure 8: On-Resistance vs. Gate-Source Voltage

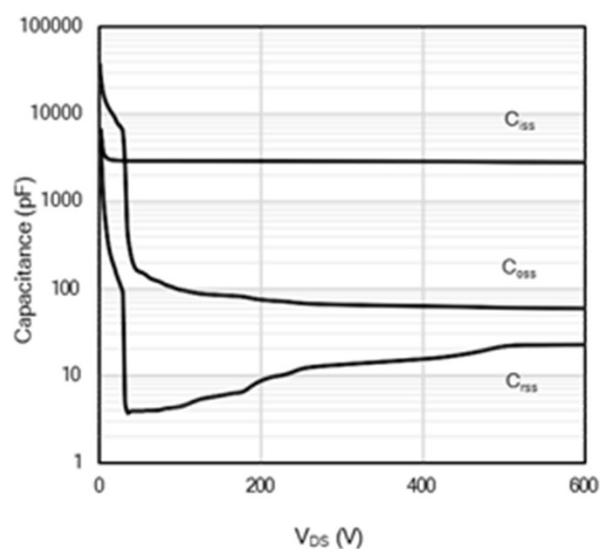


Figure 9: Capacitance Characteristics

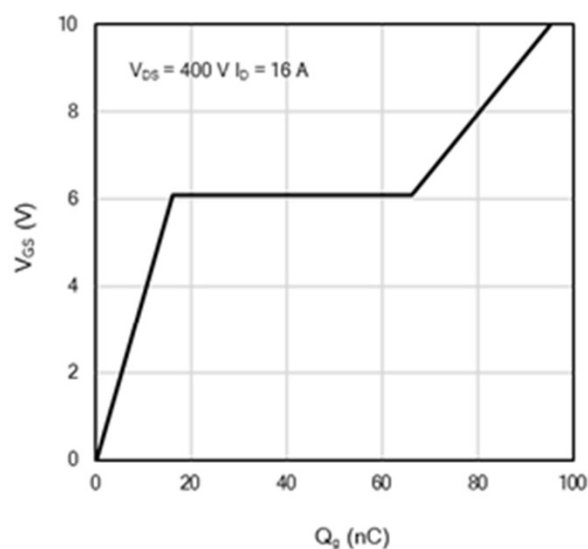


Figure 10: Gate-Charge Characteristics

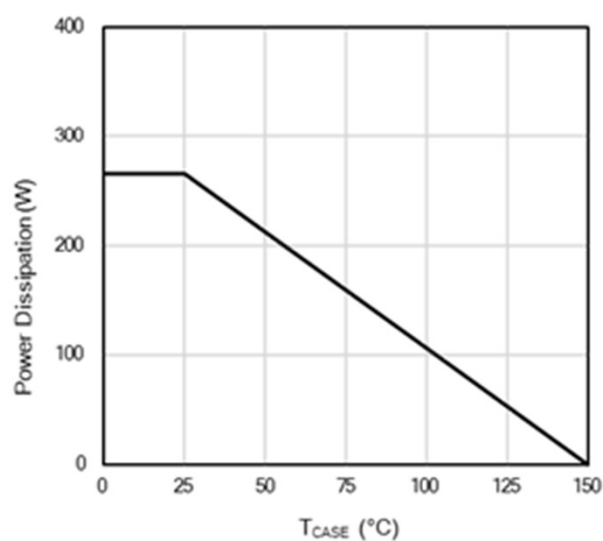


Figure 11: Power De-rating

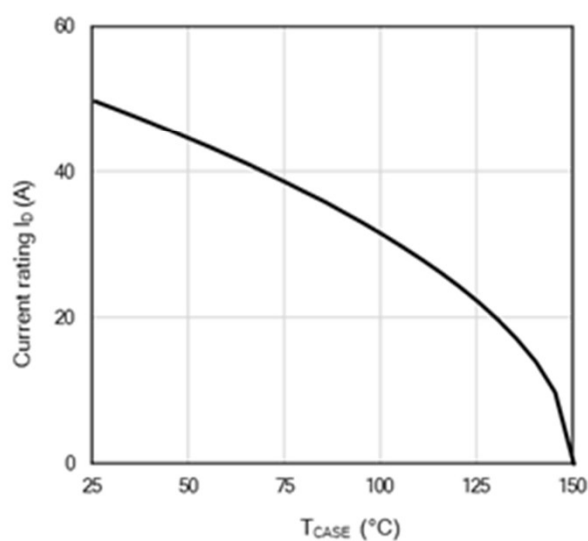


Figure 12: Current De-rating

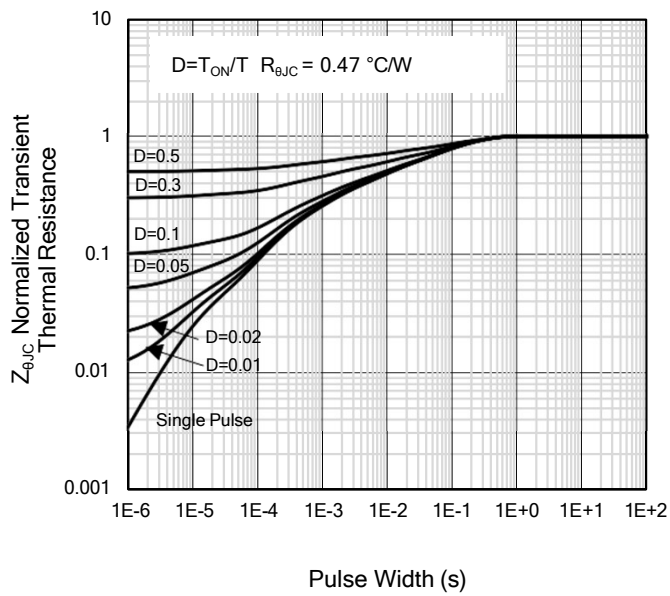


Figure 13: Normalized Maximum Transient Thermal Impedance

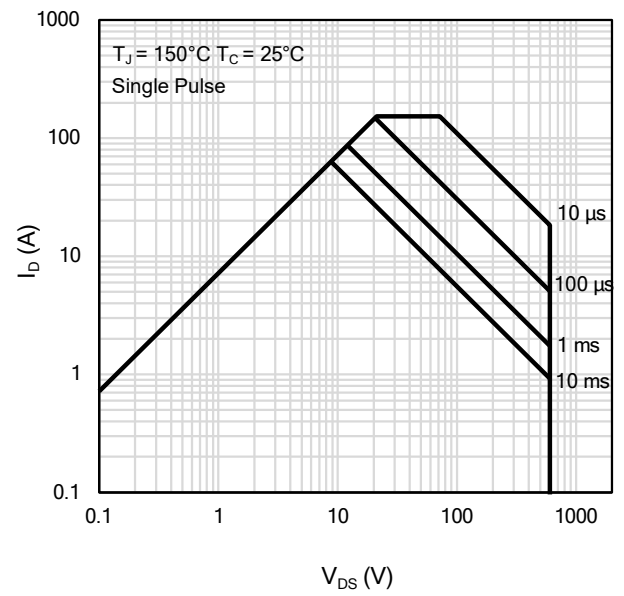


Figure 14: Maximum Forward Biased Safe Operating Area

Marking Information

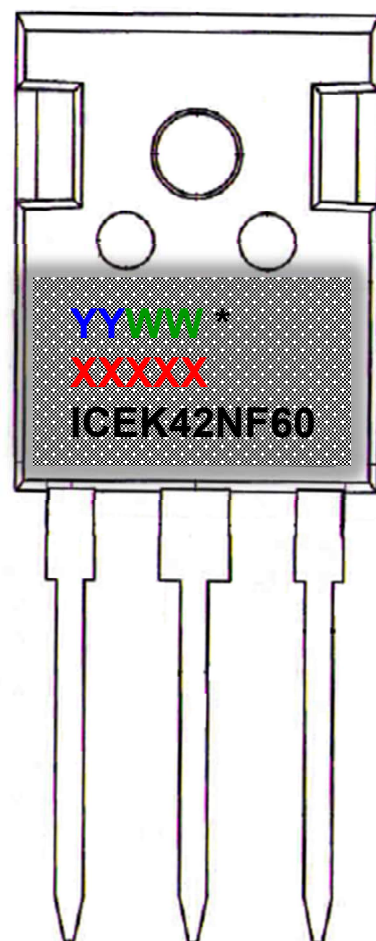
YY = Last two digits of the year

WW = Work week

***** = Site ID

XXXXXX = Lot ID

ICEK42NF60 = ICE is Icemos logo and
K42NF60 is a designated device part
number



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