IceMOS Technology

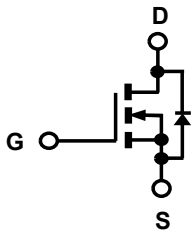
Preliminary
ICEK47NF60W

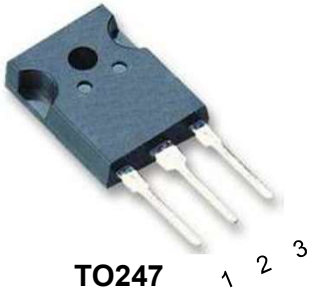
ICEK47NF60W N-Channel Enhancement Mode MOSFET

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

Features

- TO247-3L package
- Ultra Low $r_{DS(on)}$
- Ultra Low Gate Charge
- High d*v*/d*t* 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





TO247
1:G, 2:D, 3:S

(TO-247)

RoHS COMPLIANT RoHS (EU) 2015/863 CE HALOGEN FREE Pb Lead Free

Maximum ratings [a] at T_j=25°C, unless otherwise specified

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

a Preliminary data sheet - Specifications subject to change.
b limited by Tj_{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°C, unless otherwise specified

Static characteristics

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

Dynamic characteristics

Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=400 V, f=1 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 V, V_{DS}=0 to 400 V	-	129	-	pF
Effective output capacitance, time related	$C_{o(tr)}$	V_{GS}=0 V, V_{DS}=0 to 400 V, I_D=constant	-	990	-	pF
Turn-on delay time	$t_{d(on)}$	V_{DS}=400V, V_{GS}=13V, I_D=16A, R_G=3Ω (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 V, I_D=16A, V_{GS}=0 to 10 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}=0V	-	-	42	A
Pulsed forward current	I_{SM}		-	-	150	A
Diode forward voltage	V_{SD}	V_{GS}=0V, I_S=I_{rm}	-	0.95	-	V
Reverse recovery time	t_{rr}	V_{RR}=400V, I_S=I_{rm}, d_{iF}/dt=100 A/µS	-	90	-	ns
Reverse recovery charge	Q_{rr}		-	0.8	-	µC
Peak reverse recovery current	I_{rm}		-	16	-	A

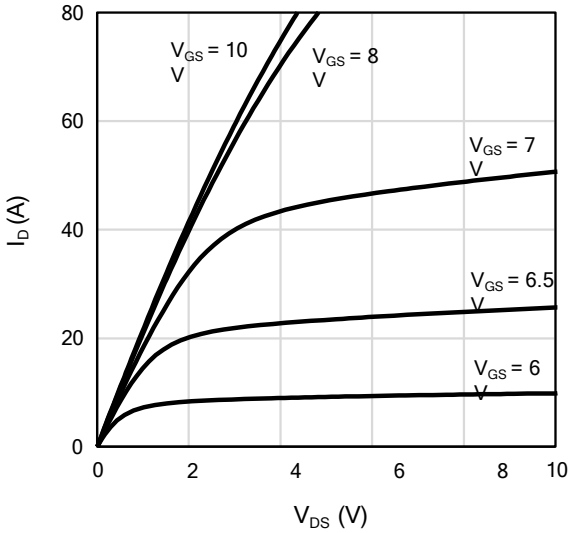


Figure 1: On-Region Characteristics

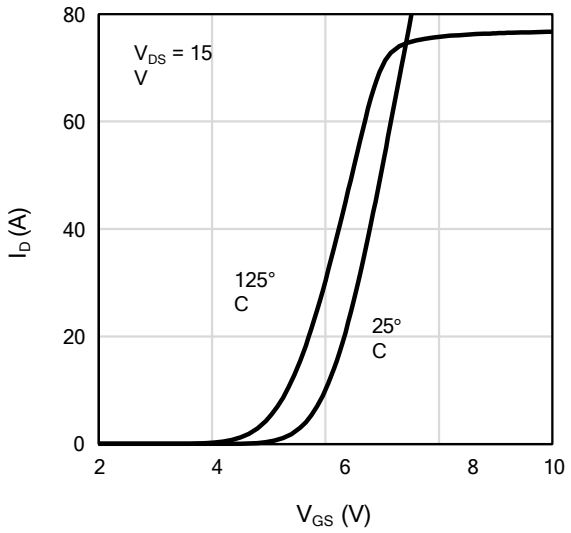


Figure 2: Transfer Characteristics

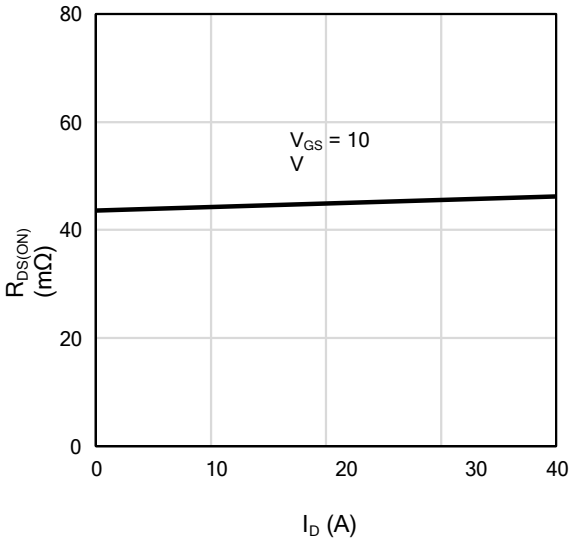


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

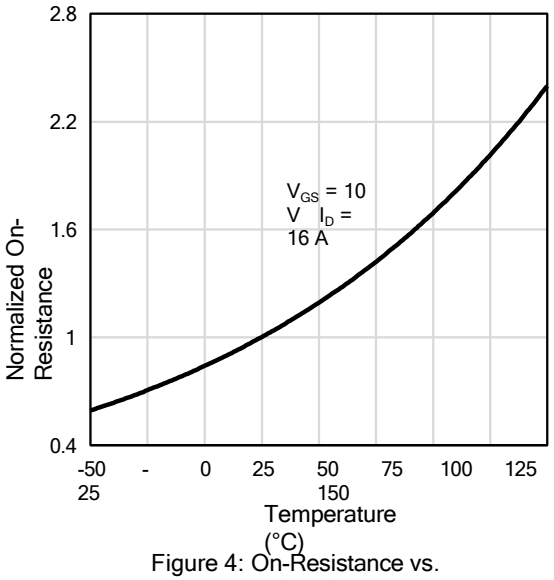


Figure 4: On-Resistance vs. Junction Temperature

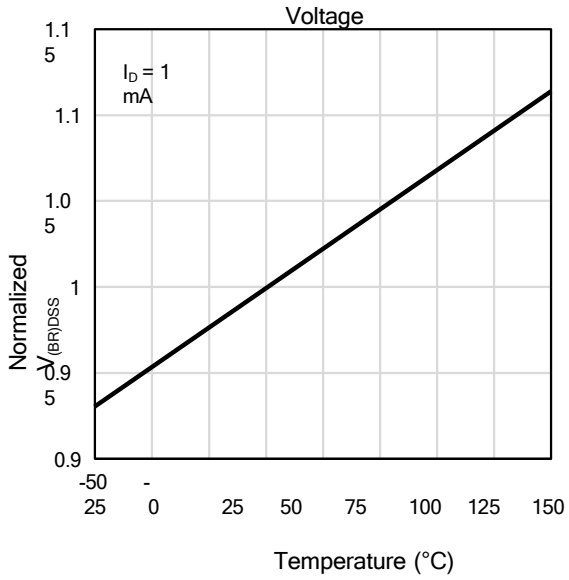


Figure 5: Breakdown Voltage vs. Junction Temperature

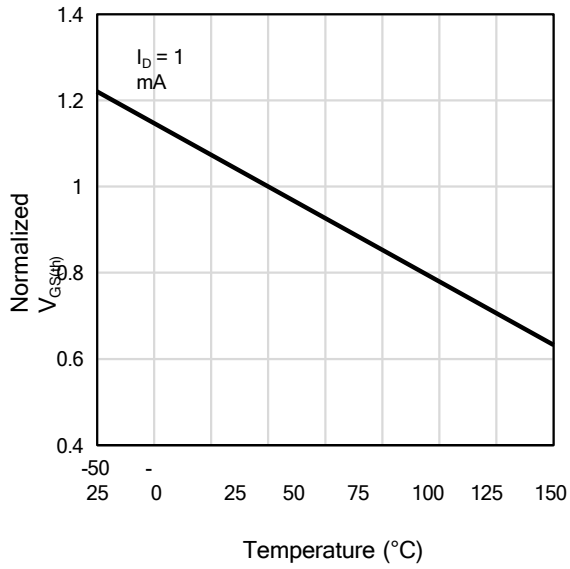


Figure 6: Threshold Voltage vs. Junction Temperature

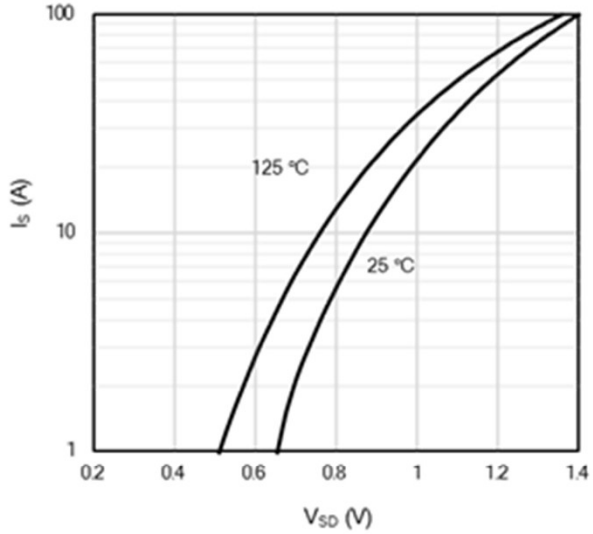


Figure 7: Body-Diode Characteristics

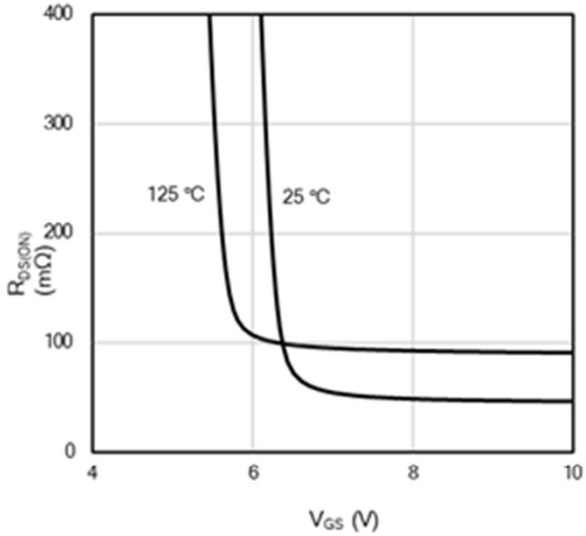


Figure 8: On-Resistance vs. Gate-Source Voltage

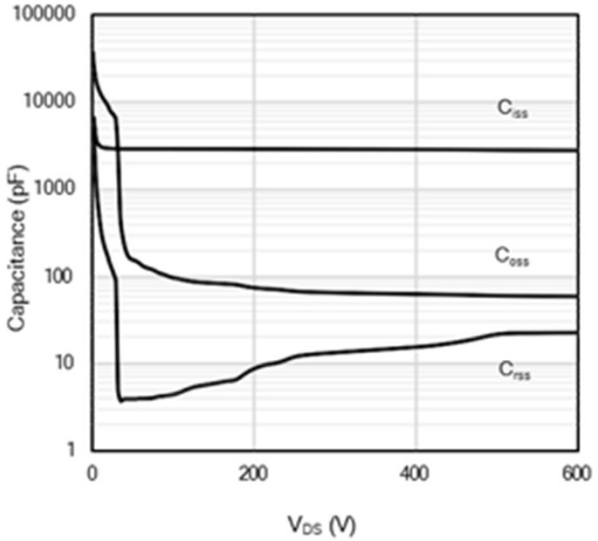


Figure 9: Capacitance Characteristics

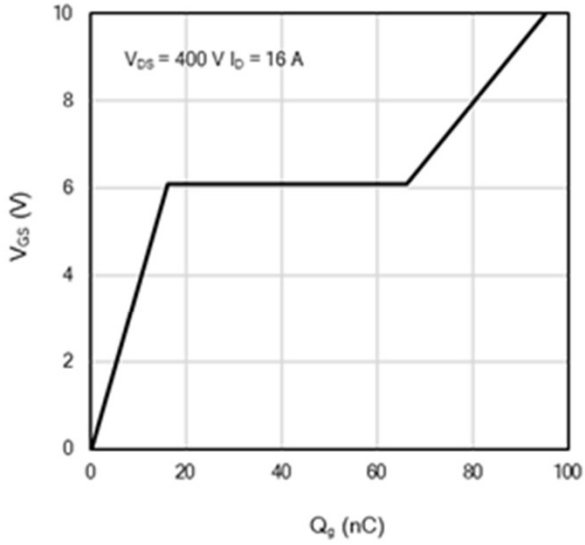


Figure 10: Gate-Charge Characteristics

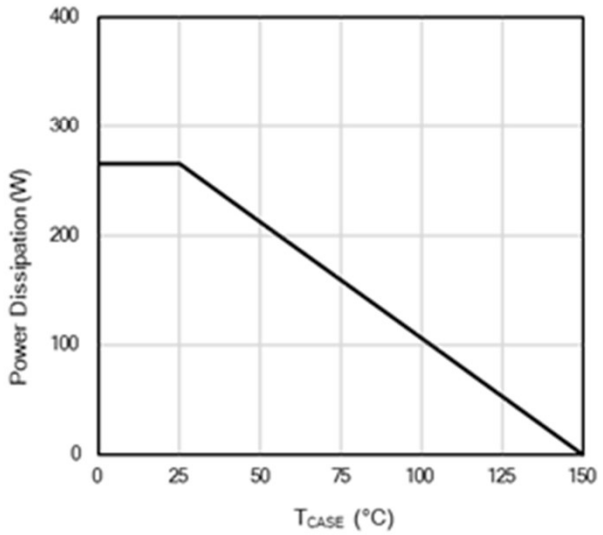


Figure 11: Power De-rating

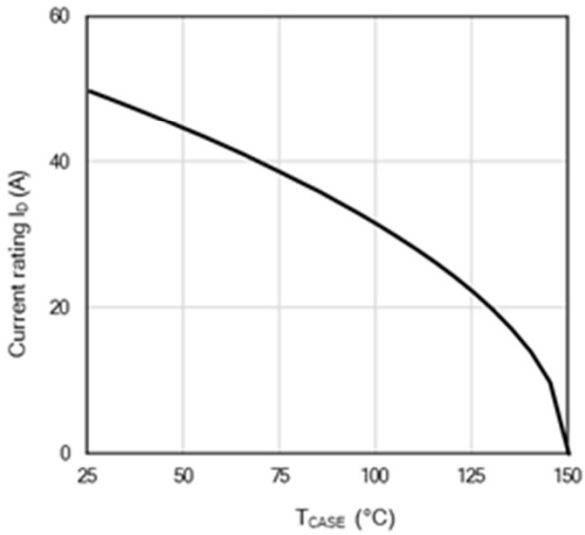


Figure 12: Current De-rating

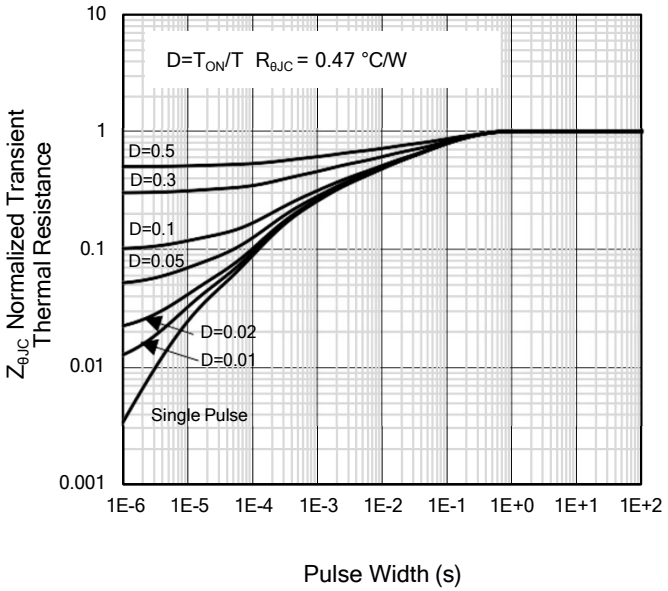


Figure 13: Normalized Maximum Transient Thermal Impedance

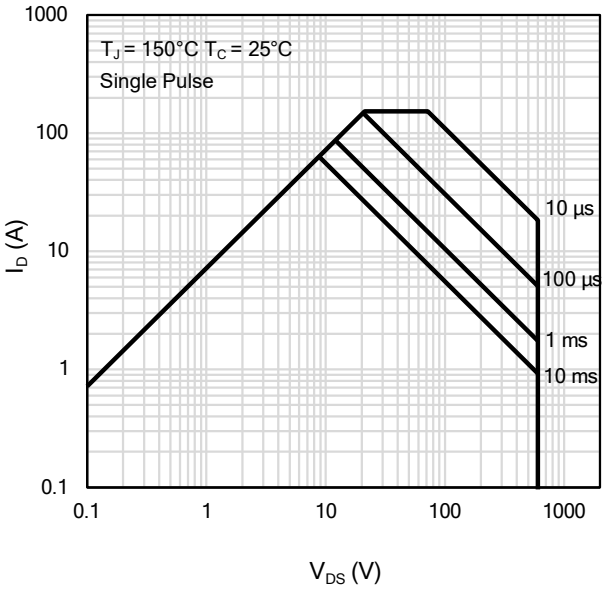


Figure 14: Maximum Forward Biased Safe Operating Area

Marking Information

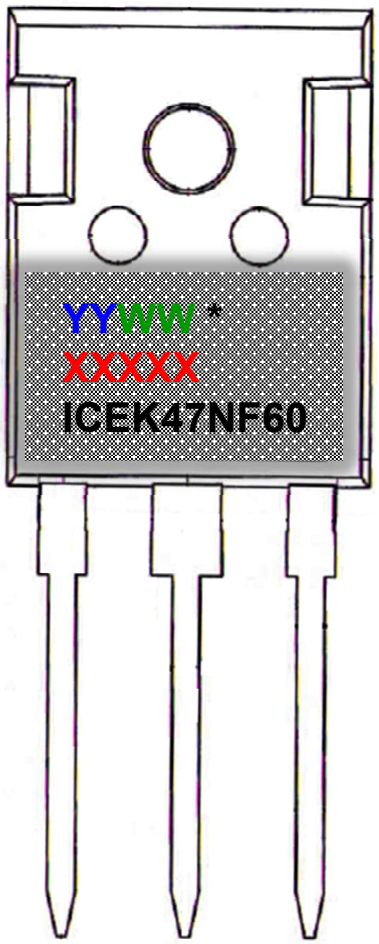
YY = Last two digits of the year

WW = Work week

***** = Site ID

XXXXX = Lot ID

ICEK47NF60 = ICE is Icemos logo and K47NF60 is a designated device part number



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