IceMOS Technology

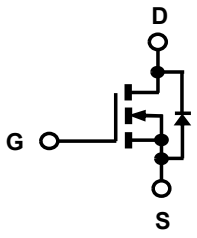
Preliminary
ICEK6NF65FP

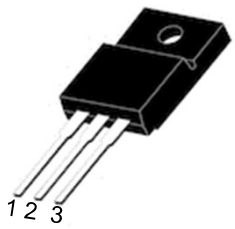
ICEK6NF65FP N-Channel Enhancement Mode MOSFET

Product Summary			
I_D	T_A=25°C	6A	Max
$V_{(BR)DSS}$	I_D=250uA	650V	Min
$r_{DS(on)}$	V_{GS}=10V	0.51	Typ
Q_g	V_{DS}=400V	14nC	Typ

Features

- Low $r_{DS(on)}$
- Ultra Low Gate Charge
- High d*v*/d*t* capability
- High Unclamped Inductive Switching (UIS) capability
- High peak current capability
- Increased transconductance performance
- Optimized design for high performance power systems





T0220FP
Isolated (T0-220)
1=Gate, 2=Drain, 3=Source.

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	6	A
		T_c=100°C	3.8	
Pulsed drain current [b]	$I_{D, pulse}$	T_c=25°C	24	A
Avalanche energy, single pulse	E_{AS}	L=75mH, V_{DD}=100V, I_D=0.9A, R_G=50Ω	30	mJ
Avalanche current, repetitive [b]	I_{AR}	limited by $T_j$max	0.9	A
MOSFET d*v*/d*t* ruggedness	d*v*/d*t*	V_{DS}=480V	50	V/ns
Reverse diode d*v*/d*t* ruggedness			50	
Gate source voltage	V_{GS}	Static	±30	V
		AC (*f*>1Hz)		
Power dissipation	P_{tot}	T_c=25°C	37.9	W
Operating and storage temperature	T_j, T_{stg}		-55 to +150	°C

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	R_{thJC}		-	-	3.3	°C/W
Thermal resistance, junction-ambient [c]	R_{thJA}	leaded	-	-	55	°C/W
Soldering temperature, wave soldering only allowed at leads	T_{sold}	1.6mm (0.063in.) from case for 10 s	-	-	260	°C

Electrical characteristics at T_j=25°C, unless otherwise specified

Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2.5	3.5	4.5	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=650V, V_{GS}=0V	-	-	10	μA
Gate source leakage current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V	-	-	±100	nA
Drain-source on-state resistance	$R_{DS\ (on)}$	V_{GS}=10V, I_D=4A	-	0.51	0.6	Ω
Gate resistance	R_G	f=1 MHz, open drain	-	28	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS}=400V, V_{GS}=0V, f=1 MHz	-	338	-	pF
Output capacitance	C_{oss}		-	13	-	pF
Reverse transfer capacitance	C_{rss}		-	5.5	-	pF
Turn-on delay time	$t_{d(on)}$	V_{DS}=400V, V_{GS}=10V, I_D=4A, R_G=5Ω (External)	-	52	-	ns
Rise time	t_r		-	8	-	ns
Turn-off delay time	$t_{d(off)}$		-	29	-	ns
Fall time	t_f		-	9	-	ns

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DS}=400V, I_D=4A, V_{GS}=0 to 10V	-	2	-	nC
Gate to drain charge	Q_{gd}		-	9	-	
Gate charge total	Q_g		-	14	-	
Reverse Diode						
Continuous forward current	I_S	V_{GS}=0V	-	-	6	A
Diode forward voltage	V_{SD}	V_{GS}=0V, I_S=I_F	-	1.3	-	V
Reverse recovery time	t_{rr}	V_{RR}=400V, I_S=4A, d_{iF}/d_t=100 A/μS	-	62	-	ns
Reverse recovery charge	Q_{rr}		-	0.33	-	μC
Peak reverse recovery current	I_{rm}		-	10	-	A

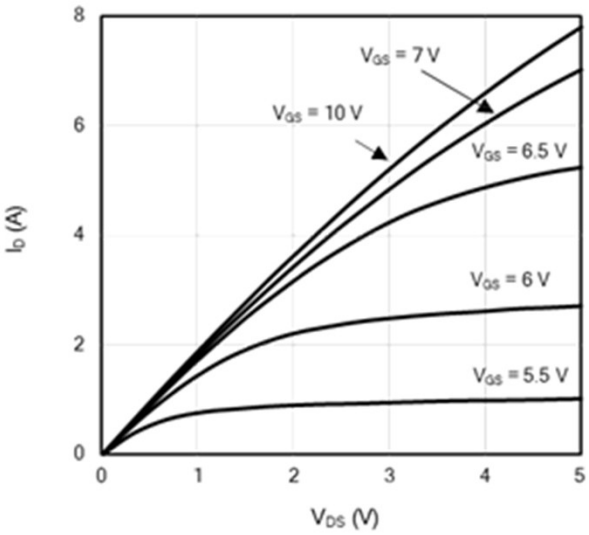


Figure 1: On-Region Characteristics

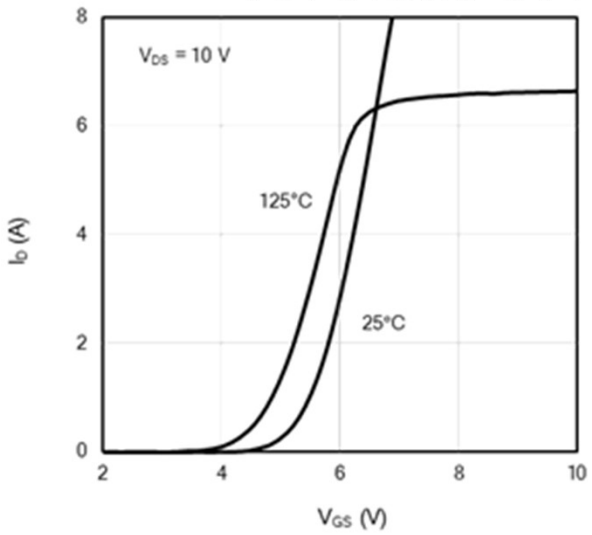


Figure 2: Transfer Characteristics

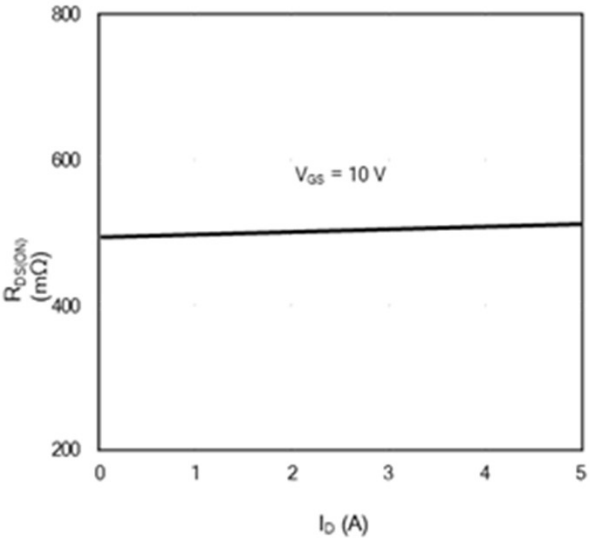


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

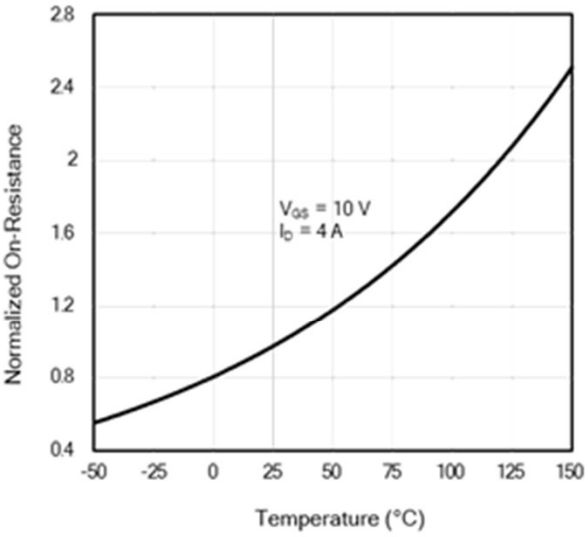


Figure 4: On-Resistance vs. Junction Temperature

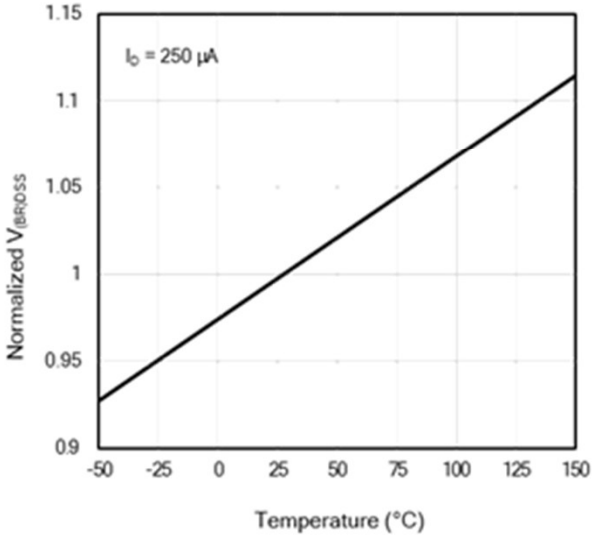


Figure 5: Breakdown Voltage vs. Junction Temperature

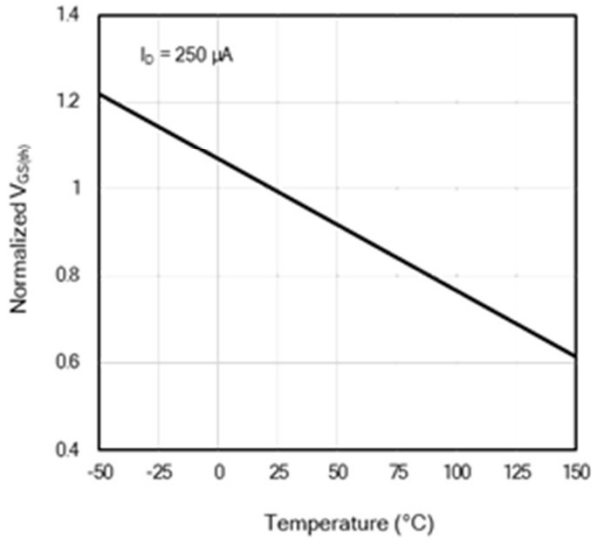


Figure 6: Threshold Voltage vs. Junction Temperature

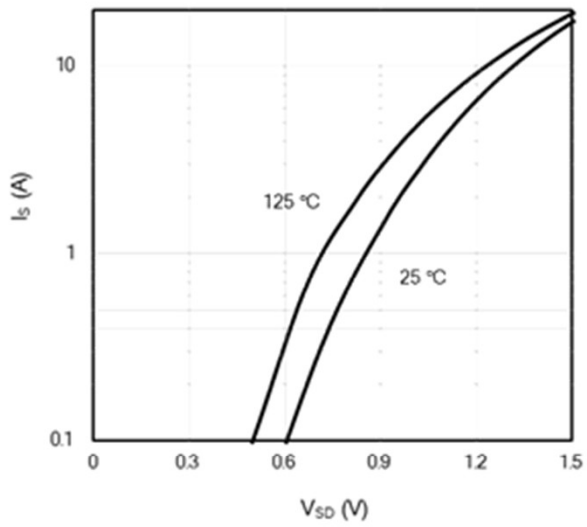


Figure 7: Body-Diode Characteristics

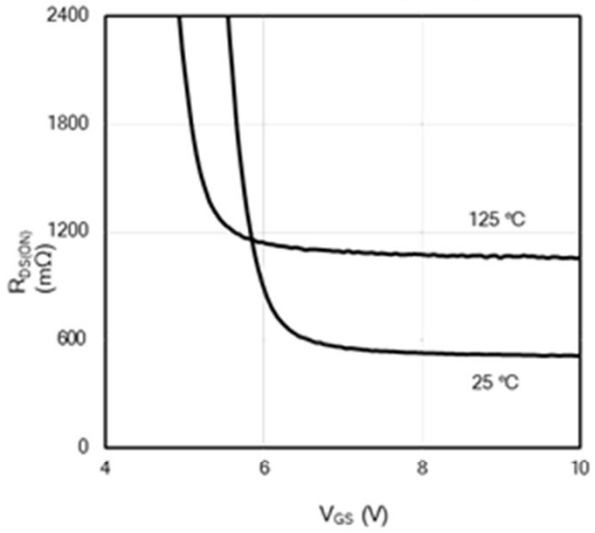


Figure 8: On-Resistance vs. Gate-Source Voltage

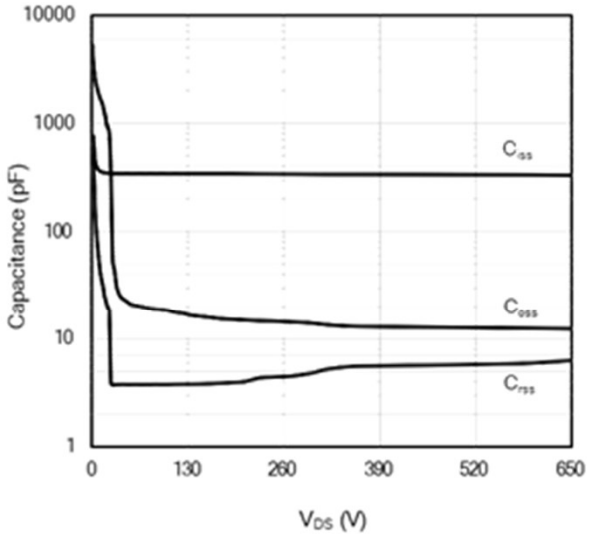


Figure 9: Capacitance Characteristics

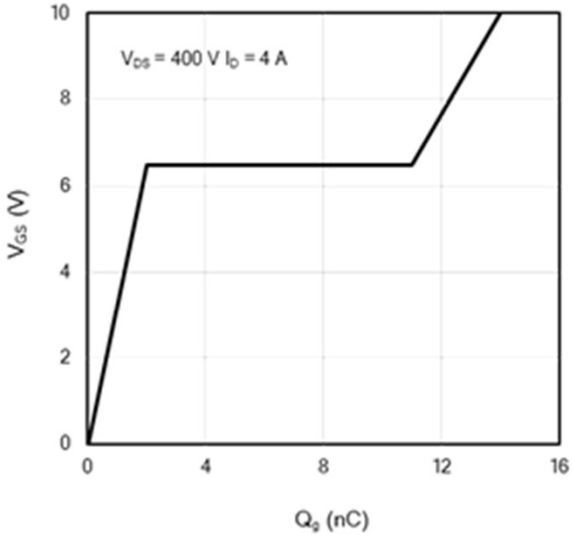


Figure 10: Gate-Charge Characteristics

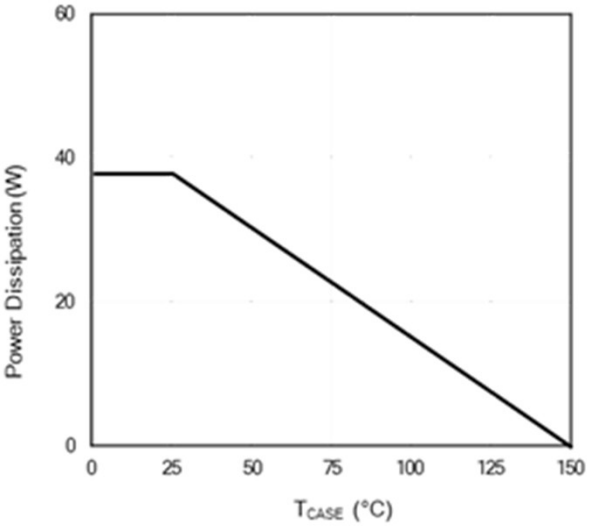


Figure 11: Power De-rating

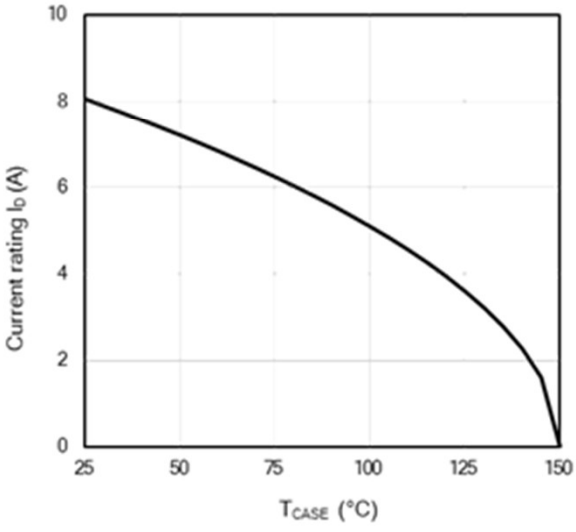


Figure 12: Current De-rating

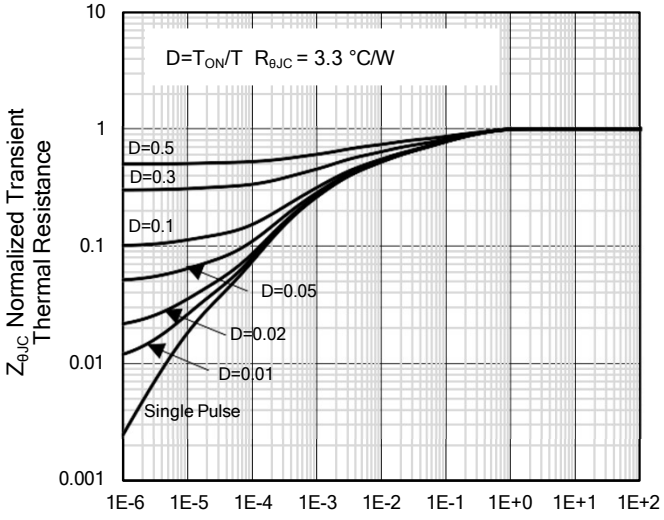


Figure 13: Normalized Maximum Transient Thermal Impedance

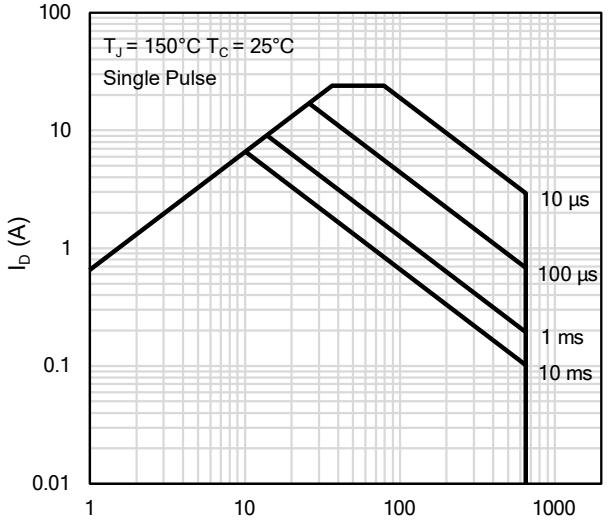


Figure 14: Maximum Forward Biased Safe Operating Area

Marking Information

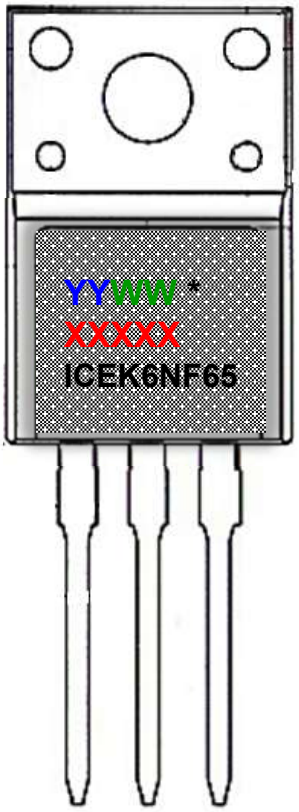
YY = Last two digits of the year

WW = Work week

* = Site ID

XXXXXX = Lot ID

ICEK6NF65 = ICE is IceMOS logo and K6NF65 is a designated device part number



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