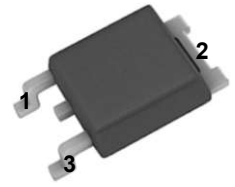
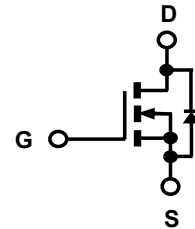


## ICEK6NF65D N-Channel Enhancement Mode MOSFET

### Features

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

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



T0252

Standard Metal  
Heatsink

1=Gate, 2=Drain,  
3=Source.



**Maximum ratings**<sup>a</sup> at  $T_j=25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current <sup>b</sup>	$I_D$	$T_c=25^\circ\text{C}$	6	A
		$T_c=100^\circ\text{C}$	3.8	
Pulsed drain current <sup>b</sup>	$I_{D, pulse}$	$T_c=25^\circ\text{C}$	24	A
Avalanche energy, single pulse	$E_{AS}$	$L=75\text{mH}$ , $V_{DD}=100\text{V}$ , $I_D=0.9\text{A}$ , $R_G=50\Omega$	30	mJ
Avalanche current, repetitive <sup>b</sup>	$I_{AR}$	limited by $T_j\text{max}$	0.9	A
MOSFET $dv/dt$ ruggedness	$dv/dt$	$V_{DS}=480\text{V}$	50	V/ns
Reverse diode $dv/dt$ ruggedness			50	
Gate source voltage	$V_{GS}$	Static	$\pm 30$	V
		AC ( $f>1\text{Hz}$ )		
Power dissipation	$P_{tot}$	$T_c=25^\circ\text{C}$	54.3	W
Operating and storage temperature	$T_j, T_{stg}$		-55 to +150	$^\circ\text{C}$

<sup>a</sup> Preliminary data sheet - Specifications subject to change.

<sup>b</sup> limited by  $T_{j\text{max}}$

<sup>c</sup> 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	$R_{thJC}$		-	-	2.3	°C/W
Thermal resistance, junction-ambient °	$R_{thJA}$	leaded	-	-	60	
Soldering temperature, wave soldering only allowed at leads	$T_{sold}$	1.6mm (0.063in.) from case for 10 s	-	-	260	°C

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

#### Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	3.5	4.5	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V$	-	-	10	$\mu A$
Gate source leakage current	$I_{GSS}$	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	$\pm 100$	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=4A$	-	0.51	0.6	$\Omega$
Gate resistance	$R_G$	$f=1\text{ MHz}$ , open drain	-	28	-	$\Omega$

#### Dynamic characteristics

Input capacitance	$C_{iss}$	$V_{DS}=400V, V_{GS}=0V, f=1\text{ MHz}$	-	338	-	pF
Output capacitance	$C_{oss}$		-	13	-	
Reverse transfer capacitance	$C_{rss}$		-	5.5	-	
Turn-on delay time	$t_{d(on)}$	$V_{DS}=400V, V_{GS}=10V, I_D=4A, R_G=5\Omega$ (External)	-	52	-	ns
Rise time	$t_r$		-	8	-	
Turn-off delay time	$t_{d(off)}$		-	29	-	
Fall time	$t_f$		-	9	-	

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

### Gate charge characteristics

Gate to source charge	$Q_{gs}$	$V_{DS}=400V, I_D=4A,$ $V_{GS}=0 \text{ to } 10V$	-	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	$t_{rr}$	$V_{RR}=400V, I_S=4A,$ $d_{iF}/d_t=100 \text{ A}/\mu\text{S}$	-	62	-	ns
Reverse recovery charge	$Q_{rr}$		-	0.33	-	$\mu\text{C}$
Peak reverse recovery current	$I_{rm}$		-	10	-	A

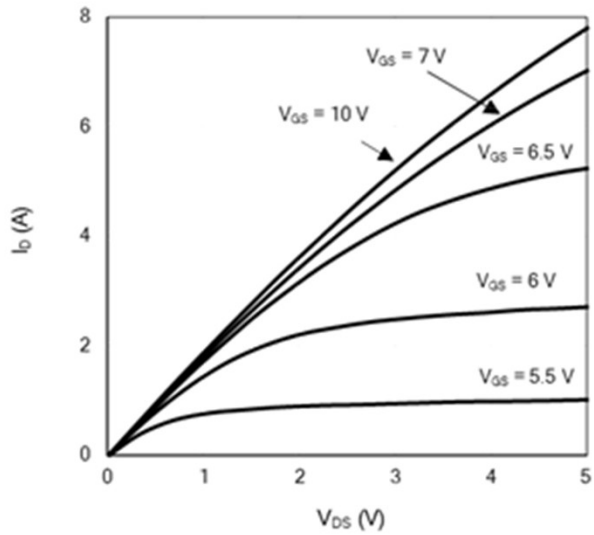


Figure 1: On-Region Characteristics

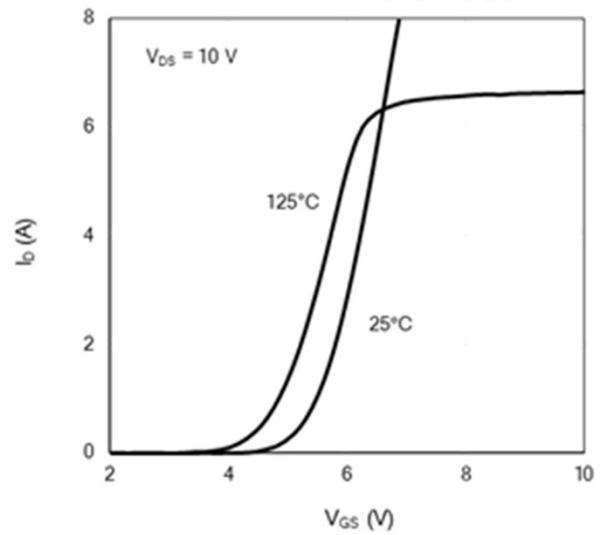


Figure 2: Transfer Characteristics

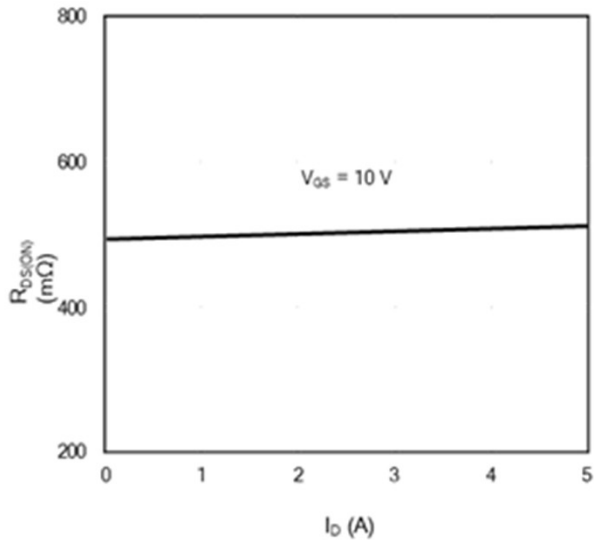


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

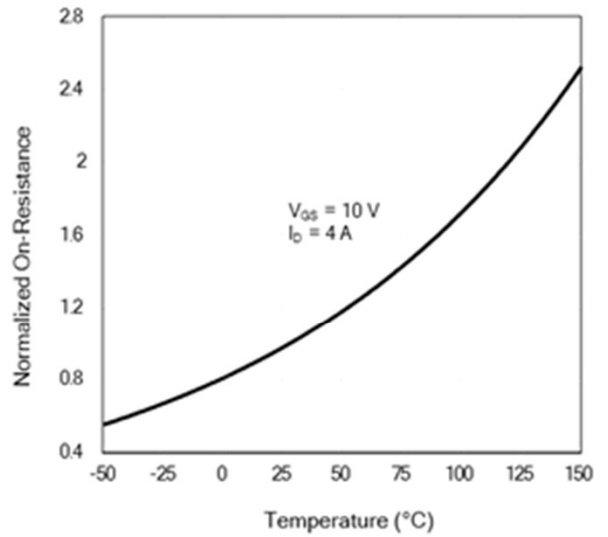


Figure 4: On-Resistance vs. Junction Temperature

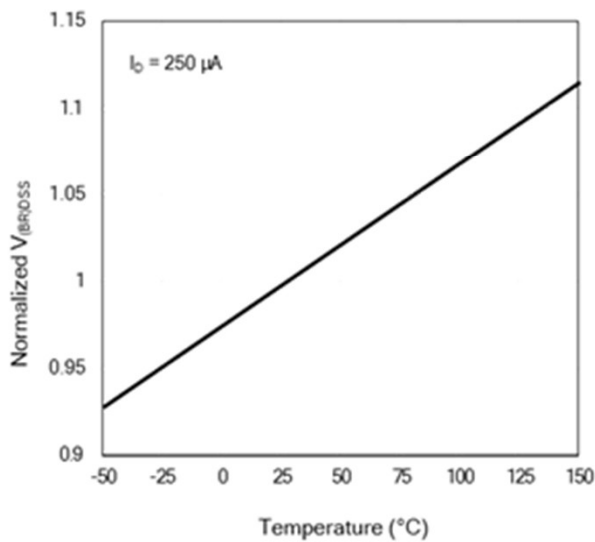


Figure 5: Breakdown Voltage vs. Junction Temperature

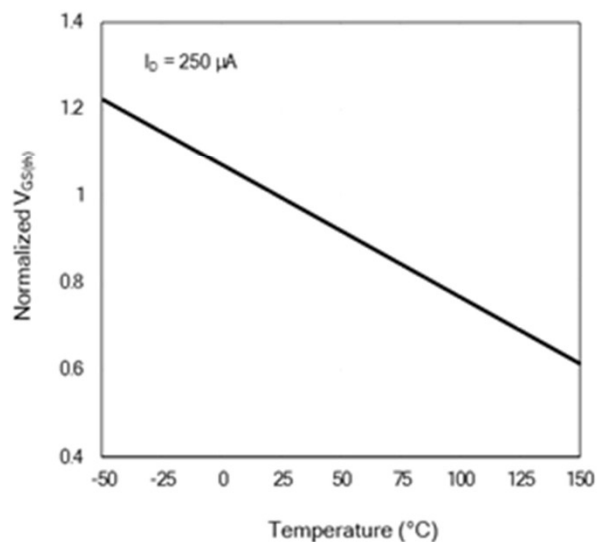


Figure 6: Threshold Voltage vs. Junction Temperature

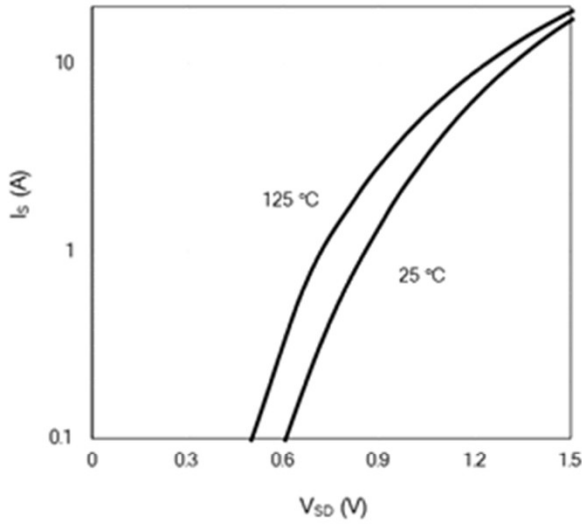


Figure 7: Body-Diode Characteristics

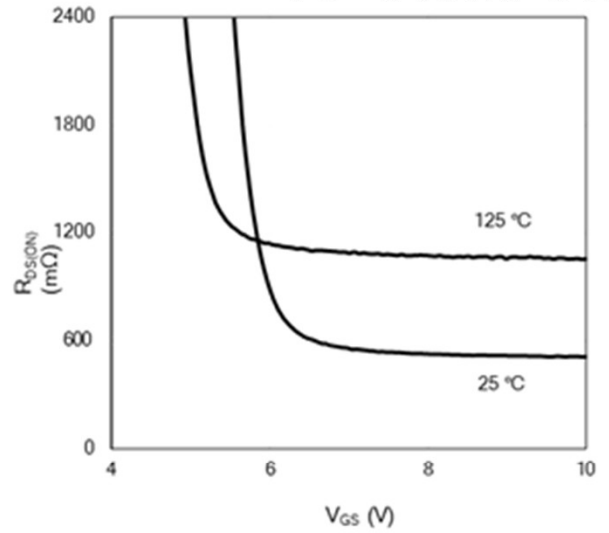


Figure 8: On-Resistance vs. Gate-Source Voltage

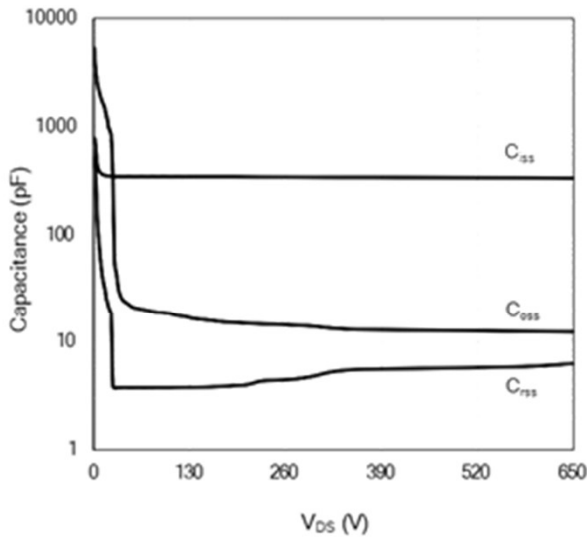


Figure 9: Capacitance Characteristics

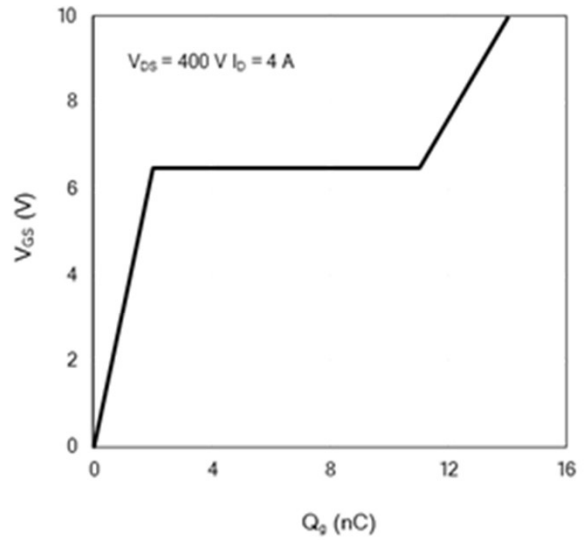


Figure 10: Gate-Charge Characteristics

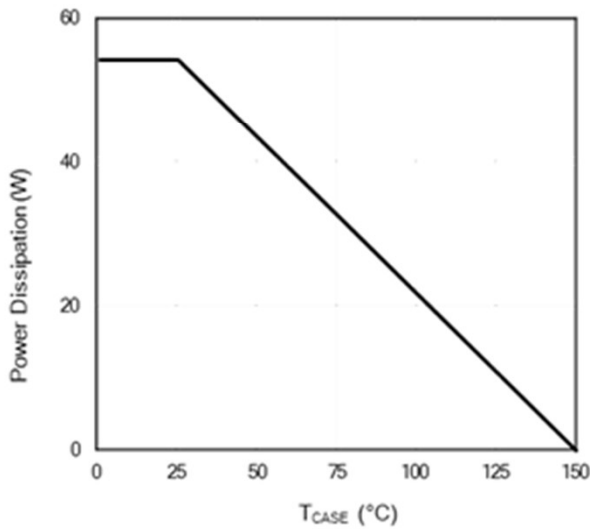


Figure 11: Power De-rating

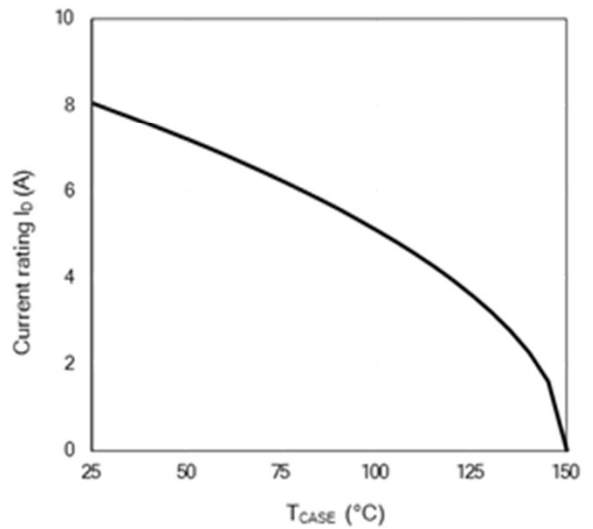


Figure 12: Current De-rating

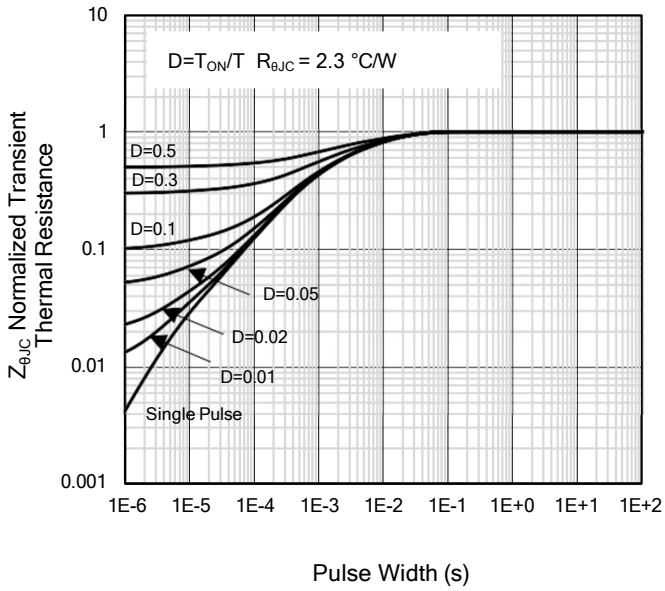


Figure 13: Normalized Maximum Transient Thermal Impedance

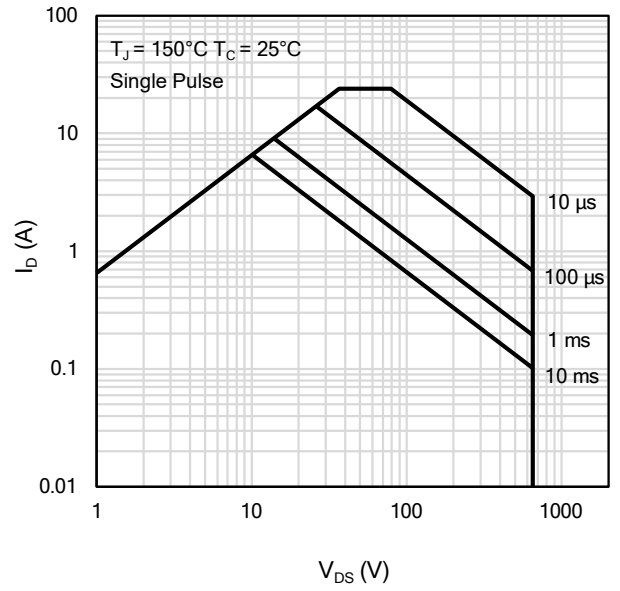


Figure 14: Maximum Forward Biased Safe Operating Area

## Marking Information

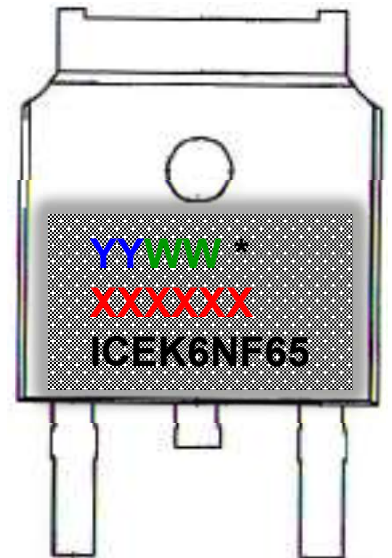
**YY** = Last two digits of the year

**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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