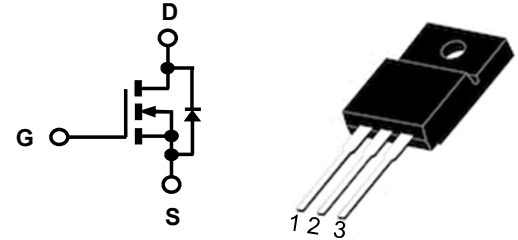


ICEK11NF65FP N-Channel Enhancement Mode MOSFET

Features

- Good FOM performance
- EMI-Friendly
- Optimized design for High Frequency Switching, and Quick Charging and Adapter

Product Summary			
I_D	$T_A=25^{\circ}\text{C}$	10.5A	Max
$V_{(BR)DSS}$	$I_D=250\mu\text{A}$	650V	Min
$r_{DS(on)}$	$V_{GS}=10\text{V}$	0.26	Typ
Q_g	$V_{DS}=400\text{V}$	22nC	Typ



Lead Free

T0220FP

Isolated (T0-220)

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

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current ^b	I_D	$T_c=25^{\circ}\text{C}$	10.5	A
		$T_c=100^{\circ}\text{C}$	6.6	
Pulsed drain current ^b	$I_{D, \text{pulse}}$	$T_c=25^{\circ}\text{C}$	45	A
Avalanche energy, single pulse	E_{AS}	$L = 75 \text{ mH}, V_{DD} = 100 \text{ V}, I_D=1.5\text{A}, R_G = 25 \Omega$	84	mJ
Avalanche current, repetitive ^b	I_{AR}	limited by $T_{j\text{max}}$	1.5	A
MOSFET dv/dt ruggedness	dv/dt	$V_{DS}=480\text{V}$	50	V/ns
Reverse diode dv/dt ruggedness			15	
Gate source voltage	V_{GS}	Static	± 30	V
		AC ($f>1\text{Hz}$)		
Power dissipation	P_{tot}	$T_c=25^{\circ}\text{C}$	44.6	W
Operating and storage temperature	T_j, T_{stg}		-55 to +150	$^{\circ}\text{C}$

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	R_{thJC}		-	-	2.8	°C/W
Thermal resistance, junction-ambient ^c	R_{thJA}	leaded	-	-	55	
Soldering temperature, wave soldering only allowed at leads	T_{sold}	1.6mm (0.063in.) from case for 10 s	-	-	260	°C

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

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}$, $I_D=250\mu\text{A}$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	2.6	3.6	4.6	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=650\text{V}$, $V_{GS}=0\text{V}$	-	-	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	$R_{DS(on)}$	$V_{GS}=10\text{V}$, $I_D=7.5\text{A}$	-	0.26	0.29	Ω
Gate resistance	R_G	$f=1\text{ MHz}$, open drain	-	20	-	Ω

Dynamic characteristics

Input capacitance	C_{iss}	$V_{DS}=400\text{ V}$, $V_{GS}=0\text{ V}$, $f=1\text{ MHz}$	-	647	-	pF
Output capacitance	C_{oss}		-	20	-	
Reverse transfer capacitance	C_{rss}		-	7	-	
Turn-on delay time	$t_{d(on)}$	$V_{DS}=400\text{V}$, $V_{GS}=10\text{V}$, $I_D=8\text{A}$, $R_G=2\Omega$ (External)	-	77	-	ns
Rise time	t_r		-	7	-	
Turn-off delay time	$t_{d(off)}$		-	35	-	
Fall time	t_f		-	6	-	

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

Gate charge characteristics

Gate to source charge	Q_{gs}	$V_{DS}=400\text{ V}, I_D=8\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	4	-	nC
Gate to drain charge	Q_{gd}		-	12	-	
Gate charge total	Q_g		-	22	-	

Reverse Diode

Continuous forward current	I_S	$V_{GS}=0\text{ V}$	-	-	10.5	A
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_S=I_F$	-	1.28	-	V
Reverse recovery time	t_{rr}	$V_{RR}=400\text{ V}, I_S=8\text{ A},$ $d_{iF}/d_t=100\text{ A}/\mu\text{S}$	-	71.5	-	ns
Reverse recovery charge	Q_{rr}		-	0.29	-	μC
Peak reverse recovery current	I_{rm}		-	8	-	A

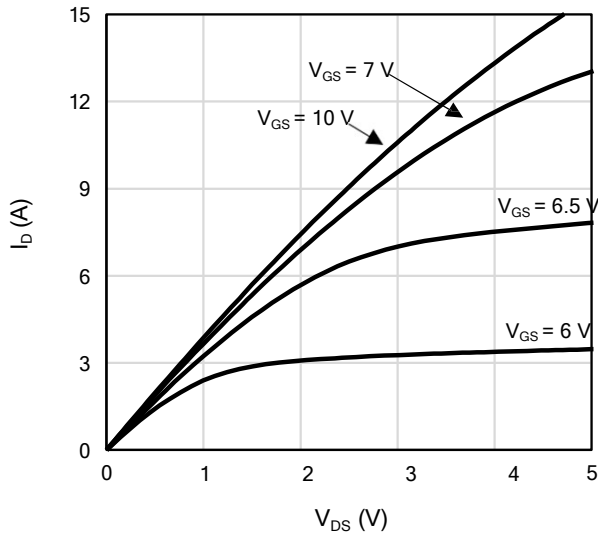


Figure 1: On-Region Characteristics

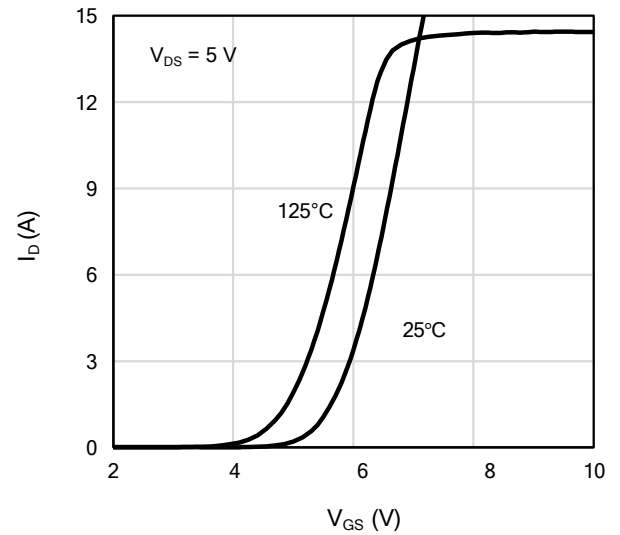


Figure 2: Transfer Characteristics

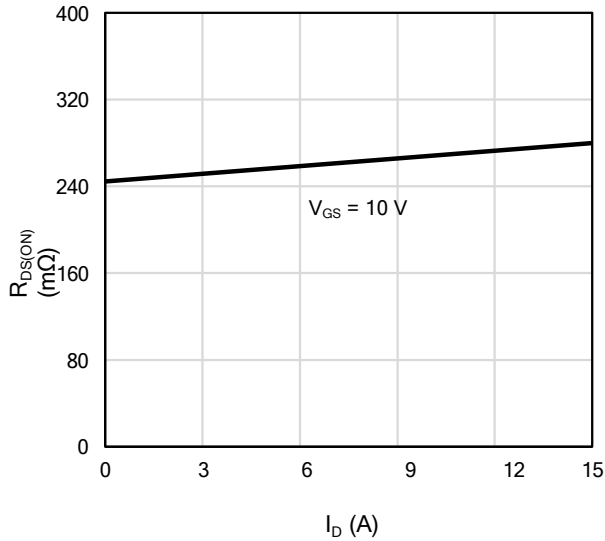


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

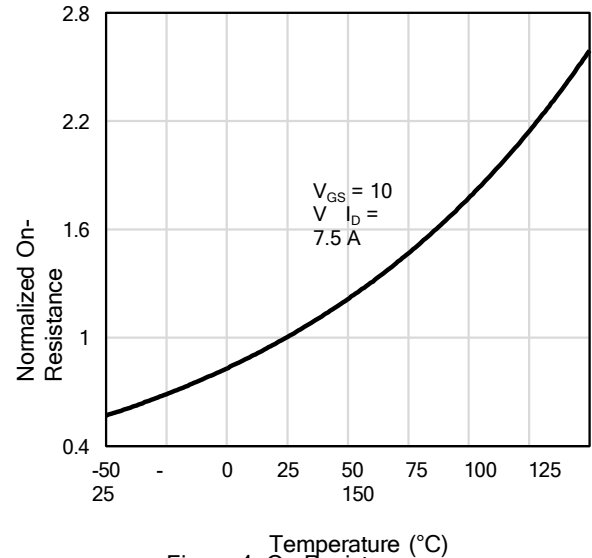


Figure 4: On-Resistance vs. Junction Temperature

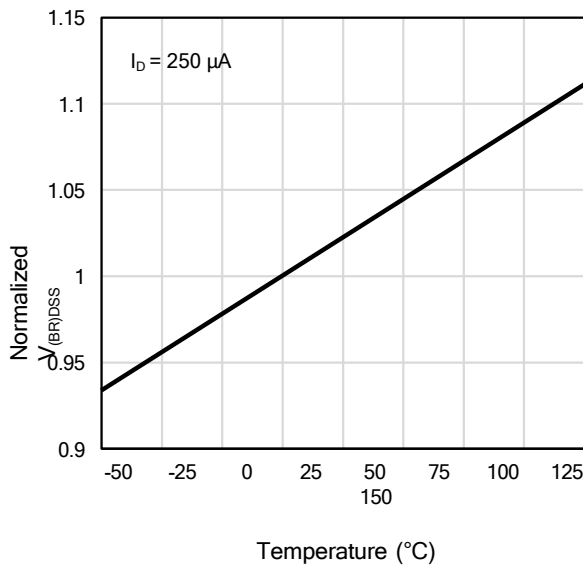


Figure 5: Breakdown Voltage vs. Junction Temperature

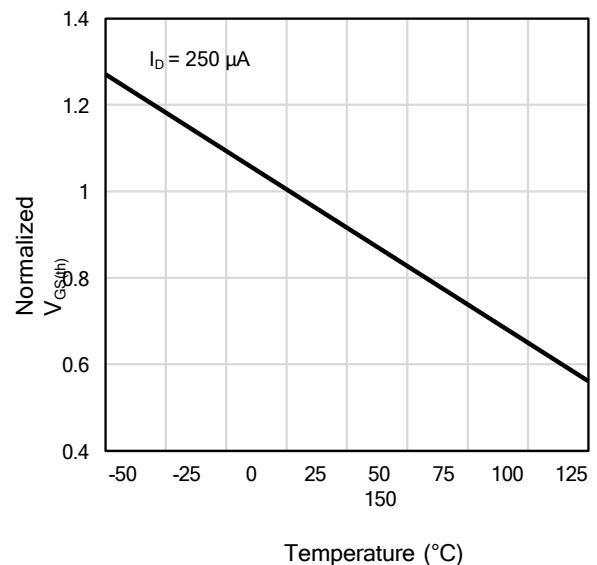


Figure 6: Threshold Voltage vs. Junction Temperature

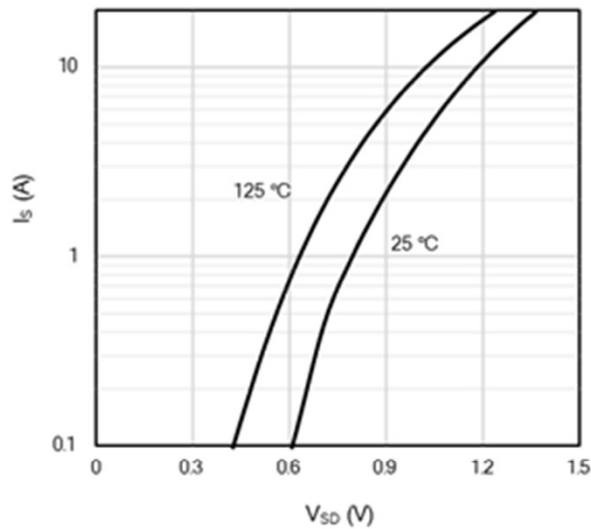


Figure 7: Body-Diode Characteristics

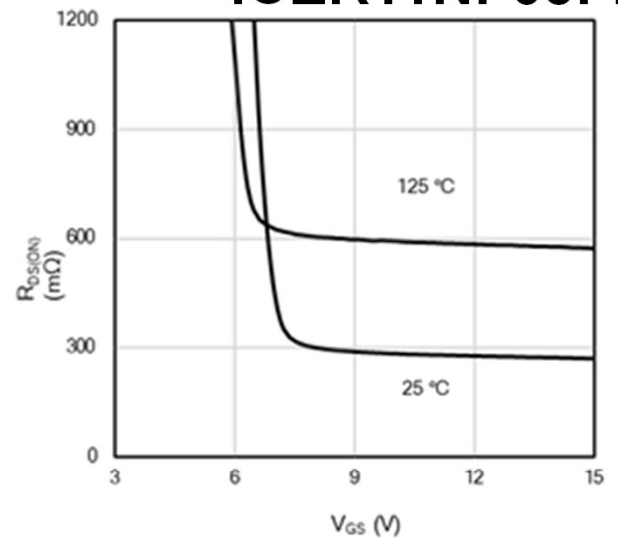


Figure 8: On-Resistance vs. Gate-Source Voltage

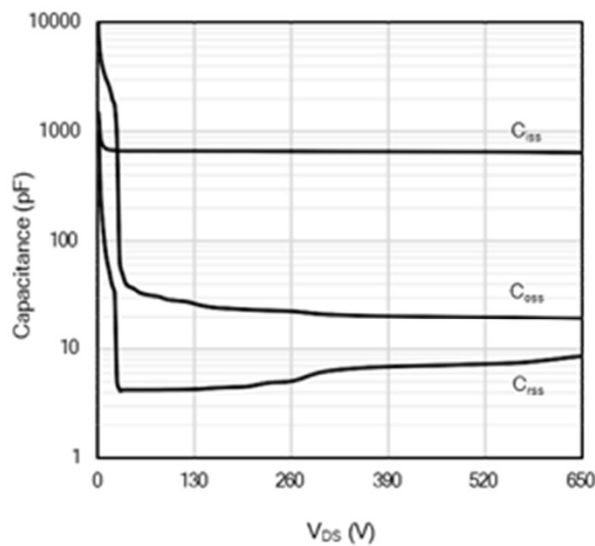


Figure 9: Capacitance Characteristics

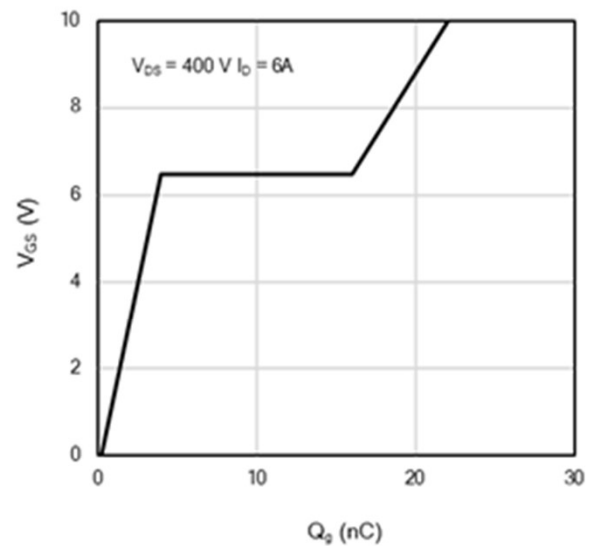


Figure 10: Gate-Charge Characteristics

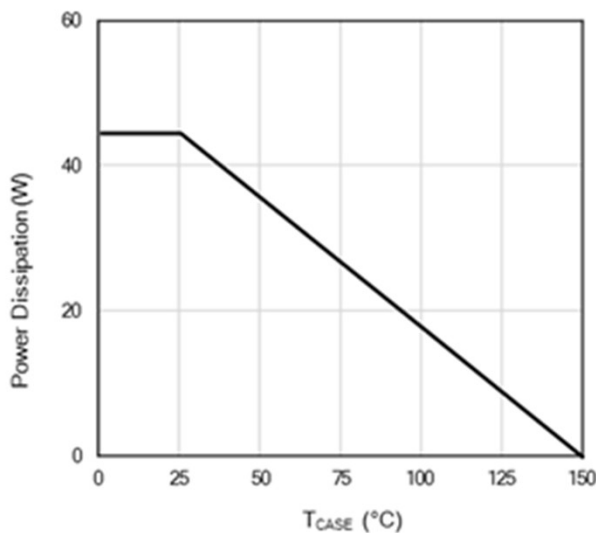


Figure 11: Power De-rating

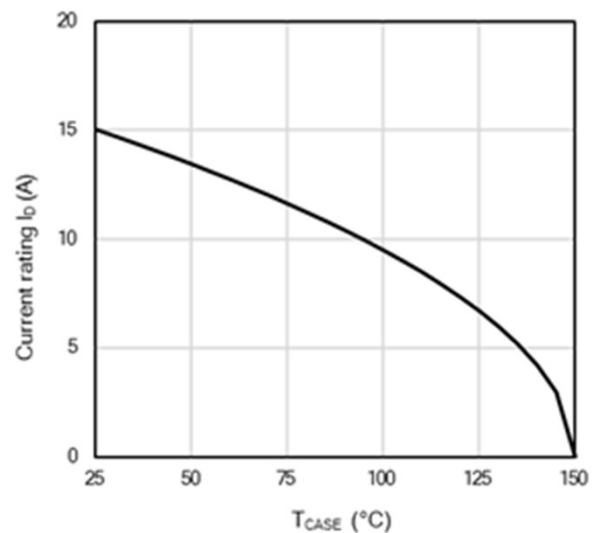


Figure 12: Current De-rating

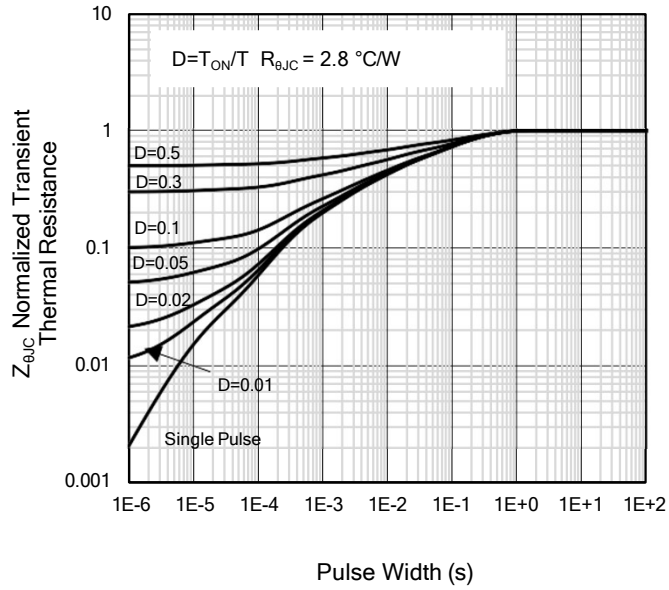


Figure 13: Normalized Maximum Transient Thermal Impedance

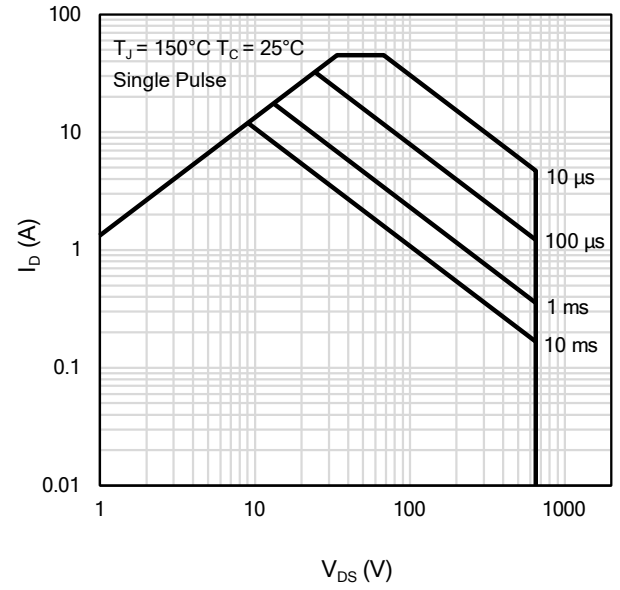
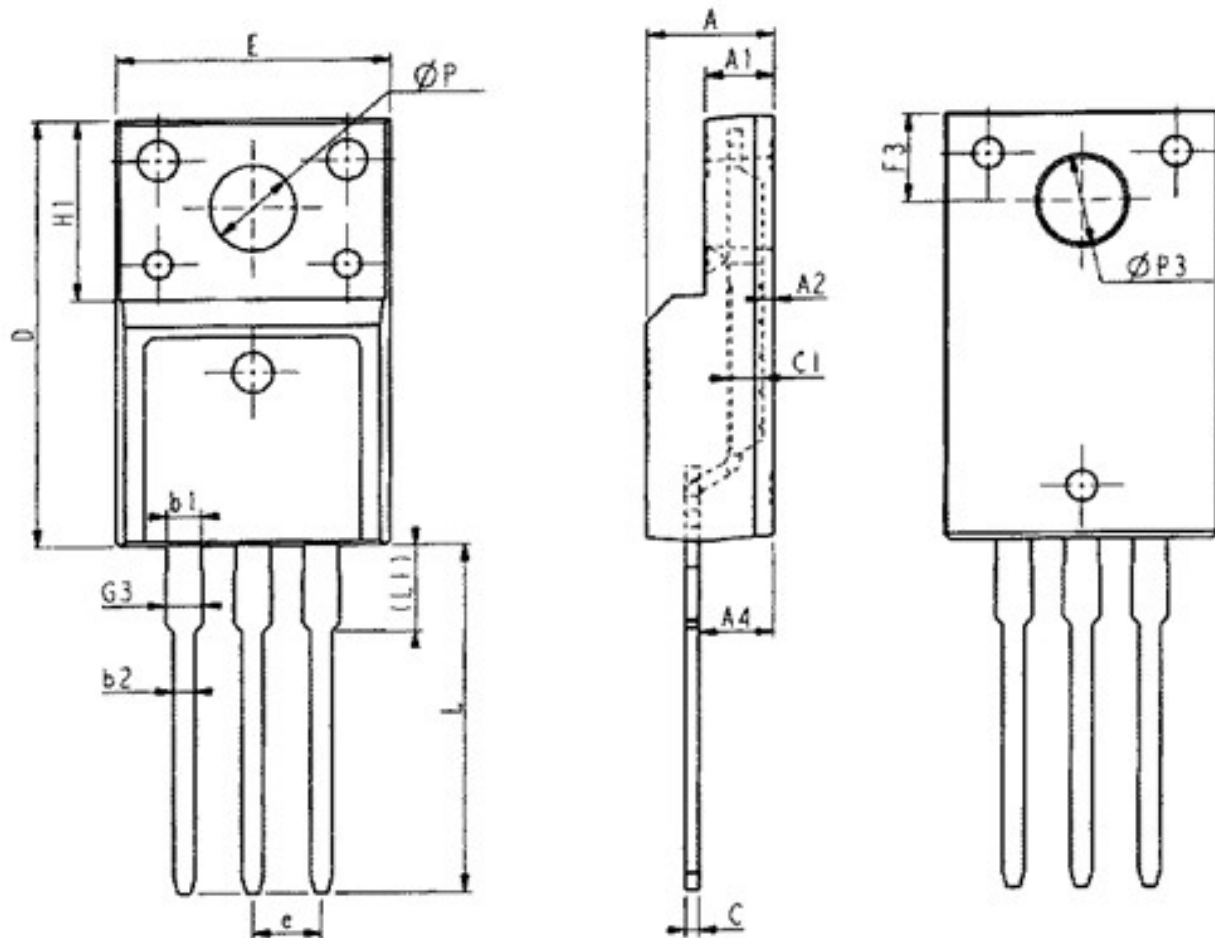


Figure 14: Maximum Forward Biased Safe Operating Area

Package Outline: TO-220MF-DG-3L



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
E	9.96	10.16	10.36
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.30	0.45	0.60
A4	2.56	2.76	2.96
c	0.40	0.50	0.65
c1	1.20	1.30	1.35
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
L	12.68	12.98	13.28
L1	3.03	3.23	3.43
ΦP	3.03	3.18	3.38
ΦP3	3.15	3.45	3.65
F3	3.15	3.30	3.45
G3	1.25	1.35	1.55
b1	1.18	1.28	1.43
b2	0.70	0.80	0.95

Marking Information

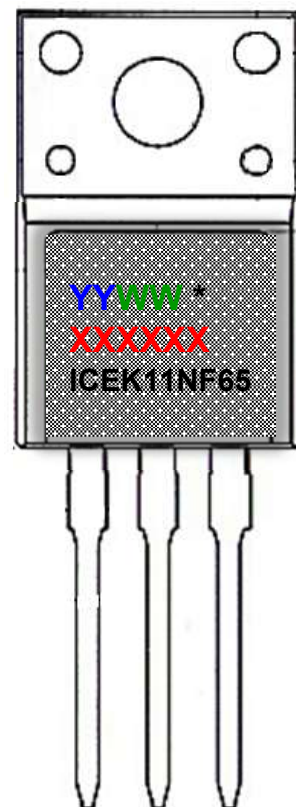
YY = Last two digits of the year

WW = Work week

***** = Site ID

XXXXXX = Lot ID

ICEK11NF65 = ICE is IceMOS logo and K11NF65 is a designated device part number



Disclaimer

Information contained in this data sheet shall in no event be regarded as a guarantee of conditions or characteristics. All product, data sheet are subject to change without notice to improve reliability. ICEMOS technology will not be responsible for damages of any nature resulting from the use or reliance upon the information contained in this data sheet.