

ICE13N65FP

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

Maximum Ratings @ $T_j = 25^\circ\text{C}$, Unless Otherwise Specified

Symbol	Parameter	Value	Unit	Conditions
I_D	Continuous Drain Current	13	A	$T_C = 25^\circ\text{C}$
$I_{D, \text{pulse}}$	Pulsed Drain Current	39	A	$T_C = 25^\circ\text{C}$
E_{AS}	Avalanche Energy, Single Pulse	460	mJ	$I_D = 6.5\text{A}$
I_{AR}	Avalanche Current, Repetitive	6.5	A	Limited by $T_{j, \text{max}}$
dv/dt	MOSFET dv/dt Ruggedness	50	V/ns	$V_{DS} = 480\text{V}$, $I_D = 13\text{A}$, $T_j = 125^\circ\text{C}$
V_{GS}	Gate Source Voltage	± 20	V	Static
		± 30		AC (f>Hz)
P_{tot}	Power Dissipation	35	W	$T_C = 25^\circ\text{C}$
T_j, T_{stg}	Operating and Storage Temperature	-55 to +150	$^\circ\text{C}$	
	Mounting Torque	50	Ncm	M 2.5 screws

Symbol	Parameter	Values			Unit	Conditions
		Min	Typ	Max		

Thermal Characteristics

R_{thJC}	Thermal Resistance, Junction to Case	-	-	3.5	$^\circ\text{C/W}$	
R_{thJA}	Thermal Resistance, Junction to Ambient	-	-	80		Leaded
T_{sold}	Soldering Temperature, Wave Soldering Only Allowed At Leads	-	-	260	$^\circ\text{C}$	1.6mm (0.063in.) from Case for 10s

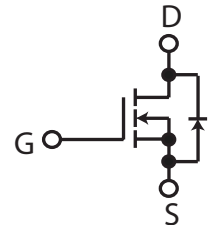
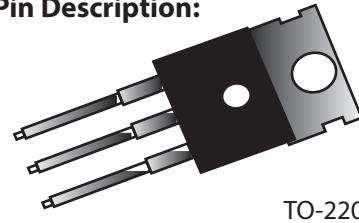
Electrical Characteristics @ $T_j = 25^\circ\text{C}$, Unless Otherwise Specified

Static Characteristics

$V_{(BR)DSS}$	Drain to Source Breakdown Voltage	650	675	-	V	$V_{GS} = 0\text{V}$, $I_D = 250\mu\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	2.1	-	3.9		$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$
I_{DSS}	Zero Gate Voltage Drain Current	-	0.1	1	μA	$V_{DS} = 650\text{V}$, $V_{GS} = 0\text{V}$, $T_j = 25^\circ\text{C}$
		-	-	100		$V_{DS} = 650\text{V}$, $V_{GS} = 0\text{V}$, $T_j = 150^\circ\text{C}$
I_{GSS}	Gate Source Leakage Current	-	-	100	nA	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$
$R_{DS(on)}$	Drain to Source On-State Resistance	-	0.25	0.28	Ω	$V_{GS} = 10\text{V}$, $I_D = 6.5\text{A}$, $T_j = 25^\circ\text{C}$
		-	0.62	-		$V_{GS} = 10\text{V}$, $I_D = 6.5\text{A}$, $T_j = 150^\circ\text{C}$
R_{GS}	Gate Resistance	-	4.7	-	Ω	f = 1 MHz, open drain

Product Summary			
I_D	$T_A = 25^\circ\text{C}$	13A	Max
$V_{(BR)DSS}$	$I_D = 250\mu\text{A}$	650V	Min
$r_{DS(on)}$	$V_{GS} = 10\text{V}$	0.25 Ω	Typ
Q_g	$V_{DS} = 480\text{V}$	59nC	Typ

Pin Description:

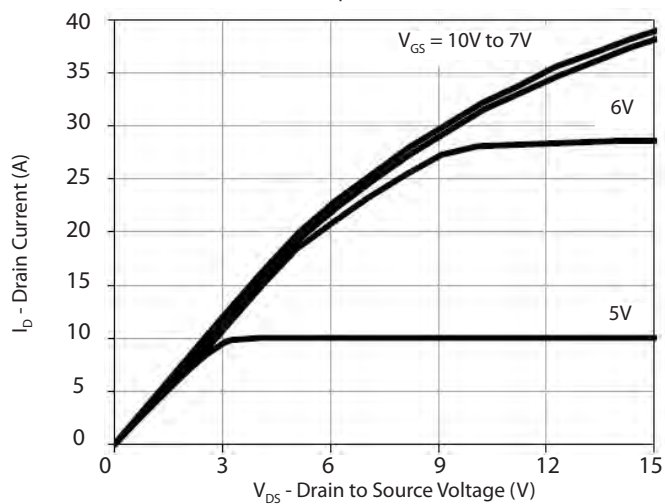


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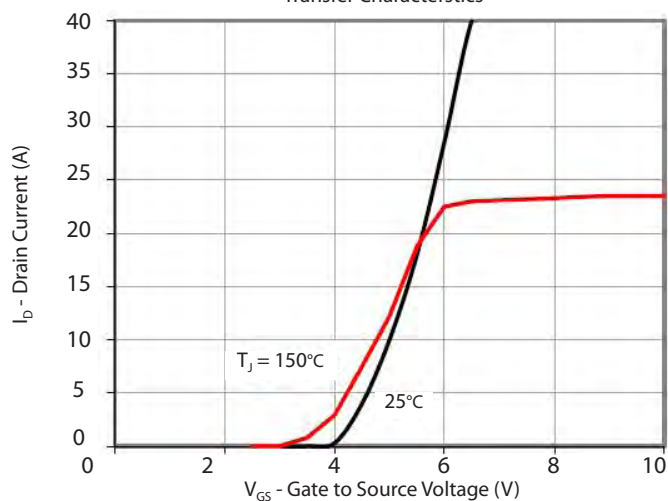
Symbol	Parameter	Values			Unit	Conditions
		Min	Typ	Max		
Dynamic Characteristics						
C _{iss}	Input Capacitance	-	1800	-	pF	V _{GS} = 0V, V _{DS} = 25V, f = 1 MHz
C _{oss}	Output Capacitance	-	600	-		
C _{rss}	Reverse Transfer Capacitance	-	5	-		
g _{fs}	Transconductance	-	15	-	S	V _{DS} = >2*I _D * R _{DS} , I _D = 6.5A
t _{d(on)}	Turn-on Delay Time	-	39	-	nS	V _{DS} = 380V, V _{GS} = 10V, I _D = 13A, R _G = 4Ω (External)
T _r	Rise Time	-	10	-		
t _{d(off)}	Turn-off Delay Time	-	55	-		
t _f	Fall Time	-	6	-		
Gate Charge Characteristics						
Q _{gs}	Gate to Source Charge	-	11	-	nC	V _{DS} = 480V, I _D = 13A, V _{GS} = 0 to 10V
Q _{gd}	Gate to Drain Charge	-	18	-		
Q _g	Gate Charge Total	-	59	-		
V _{plateau}	Gate Plateau Voltage	-	5.5	-	V	
Reverse Diode						
V _{SD}	Diode Forward Voltage	-	0.9	1.2	V	V _{GS} = 0V, I _S = I _F
t _{rr}	Reverse Recovery Time	-	400	-	ns	V _{RR} = 480V, I _S = I _F , d _{iF} /d _t = 100 A/μS
Q _{rr}	Reverse Recovery Charge	-	6	-	μC	
I _{rm}	Peak Reverse Recovery Current	-	35	-	A	

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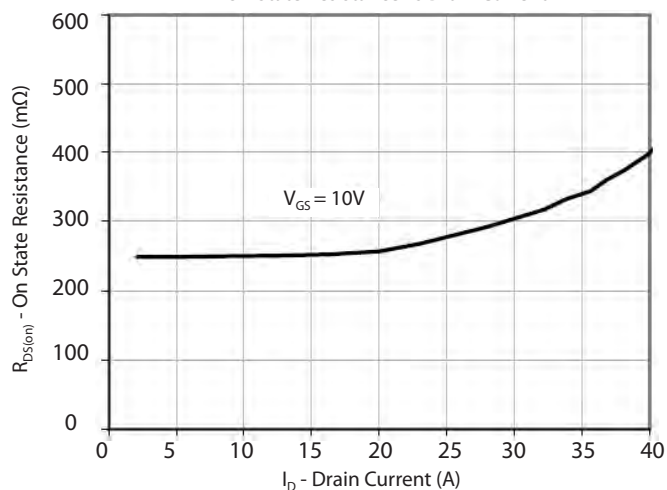
Output Characteristics



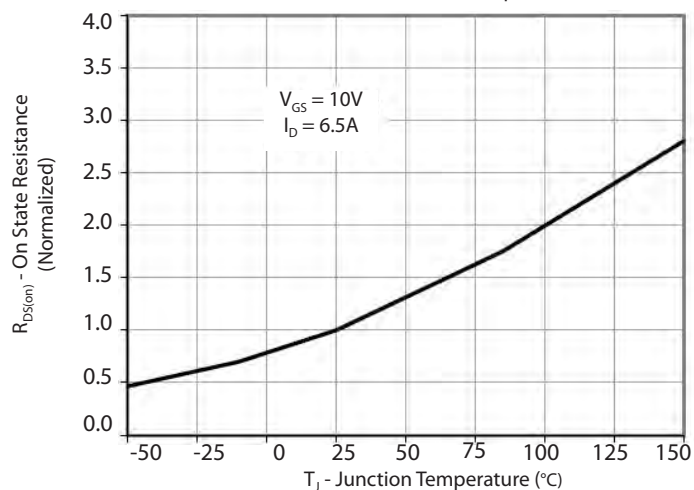
Transfer Characteristics



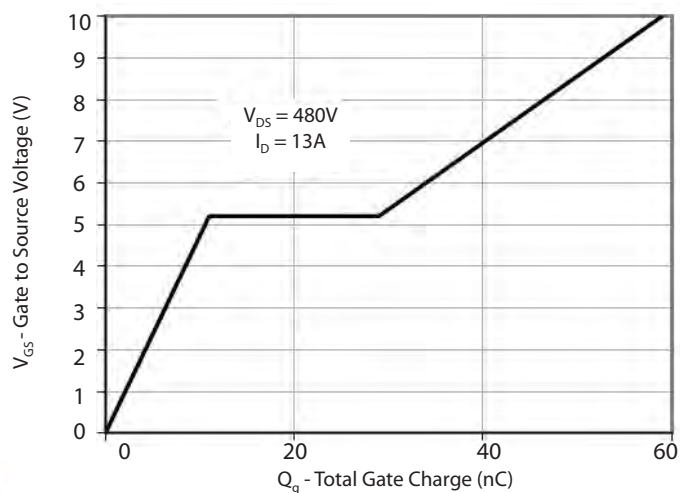
On State Resistance vs Drain Current



On Resistance vs Junction Temperature

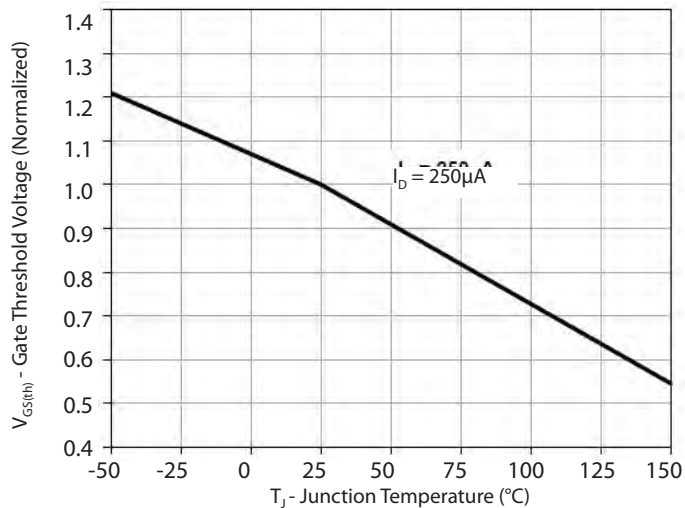


Gate Charge

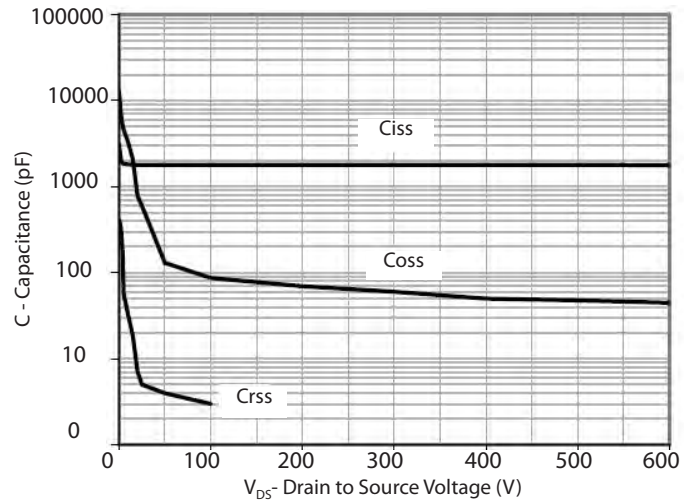


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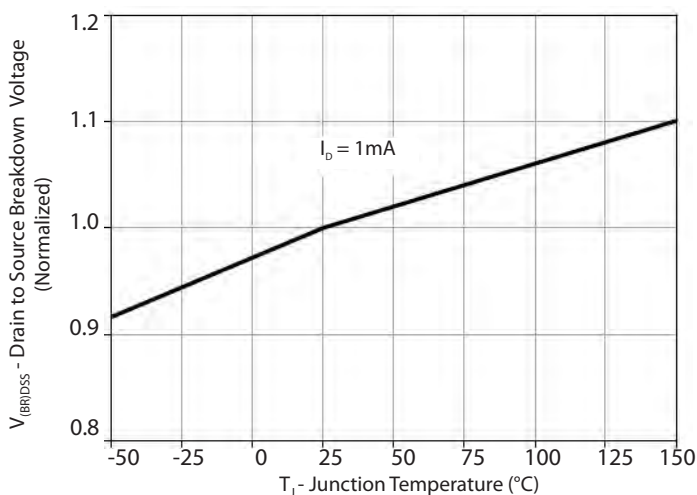
Gate Threshold Voltage vs. Junction Temperature



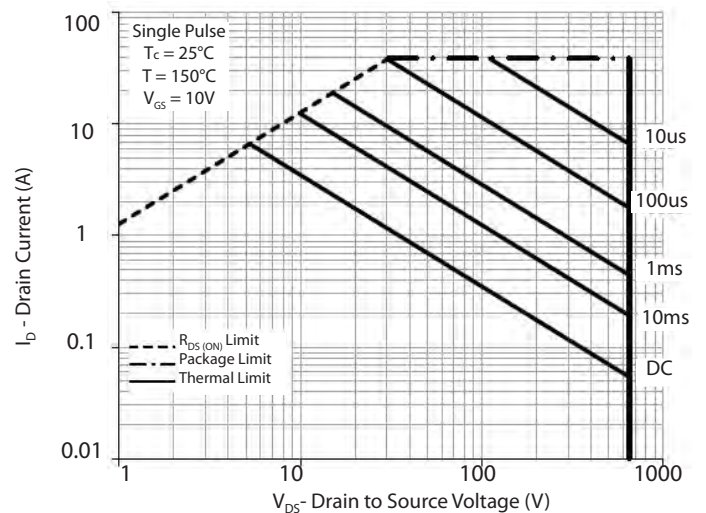
Capacitance



Drain to Source Breakdown Voltage vs. Junction Temperature



Maximum Rate Forward Biased Safe Operating Area



Transient Thermal Response - Junction to Case

