

N-Channel Enhancement Mode Field Effect Transistor

RC45N10K

Product Summary

- V_{DS} 100V
- I_D 45A
- $R_{DS(on)}$ (at $V_{GS}=10V$) <17 mohm
- $R_{DS(on)}$ (at $V_{GS}=4.5V$) <21.5 mohm
- 100% UIS Tested
- 100% ∇V_{DS} Tested

General Description

- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery

Applications

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

■ Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

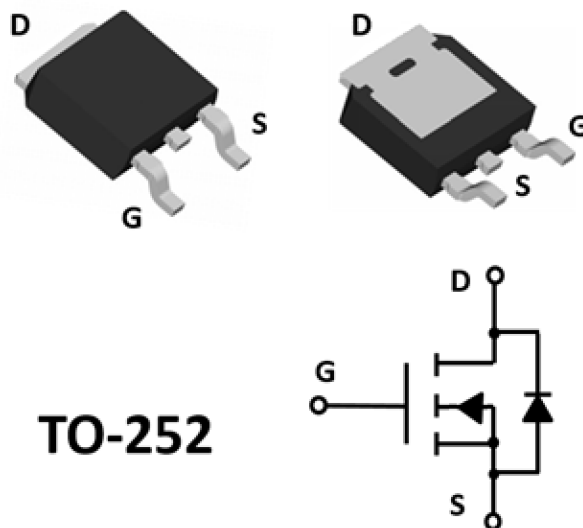
Parameter		Symbol	Limit	Unit
Drain-source Voltage		V_{DS}	100	V
Gate-source Voltage		V_{GS}	± 20	V
Drain Current	$T_C=25^\circ\text{C}$	I_D	45	A
	$T_C=100^\circ\text{C}$		28.5	
Pulsed Drain Current ^A		I_{DM}	180	A
Avalanche energy ^B		E_{AS}	81	mJ
Total Power Dissipation ^C	$T_C=25^\circ\text{C}$	P_D	72	W
	$T_C=100^\circ\text{C}$		28.8	
Junction and Storage Temperature Range		T_J, T_{STG}	-55~+150	$^\circ\text{C}$

■ Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient ^D	$t \leq 10S$	$R_{\theta JA}$	15	20	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Ambient ^D	Steady-State		40	50	
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	1.35	1.7	

■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
RC45N10	F1		2500	/	25000	13"Reel



TO-252

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■ Electrical Characteristics (T_j=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D =250μA	100			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =100,V _{GS} =0V			1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} =0V			±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D =250μA	1	1.8	3	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D =20A		14	17	mΩ
		V _{GS} = 4.5V, I _D =20A		17	21.5	mΩ
Diode Forward Voltage	V _{SD}	I _S =20A,V _{GS} =0V			1.3	V
Maximum Body-Diode Continuous Current	I _S				45	A
Gate resistance	R _G	f= 1 MHz, Open drain		1		Ω
Dynamic Parameters						
Input Capacitance	C _{ISS}	V _{DS} =50V,V _{GS} =0V,f=1MHZ		1135		pF
Output Capacitance	C _{OSS}			399		
Reverse Transfer Capacitance	C _{RSS}			18		
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =10V,V _{DS} =50V,I _D =25A		16		nC
Gate-Source Charge	Q _{gs}			5.6		
Gate-Drain Charge	Q _{gd}			2.4		
Reverse Recovery Chrage	Q _{rr}	I _F =20A, di/dt=100A/us		42		ns
Reverse Recovery Time	t _{rr}			39.8		
Turn-on Delay Time	t _{D(on)}	V _{GS} =10V, V _{DD} =50V,I _D =25A R _{GEN} =2.2Ω		39.2		
Turn-on Rise Time	t _r			11		
Turn-off Delay Time	t _{D(off)}			53.2		
Turn-off fall Time	t _f			15.8		

- A. Repetitive rating; pulse width limited by max. junction temperature.
 B. V_{DD}=50V, R_G=25Ω, L=0.5mH, I_{AS}=25A,.
 C. Pd is based on max. junction temperature, using junction-case thermal resistance.
 D. The value of R_{qJA} is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C. The Power dissipation PDSM is based on R_{qJA} ≤ 10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

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■ Typical Performance Characteristics

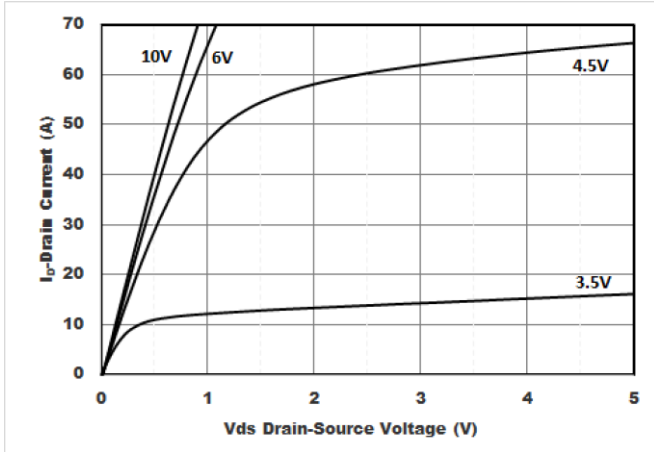


Figure1. Output Characteristics

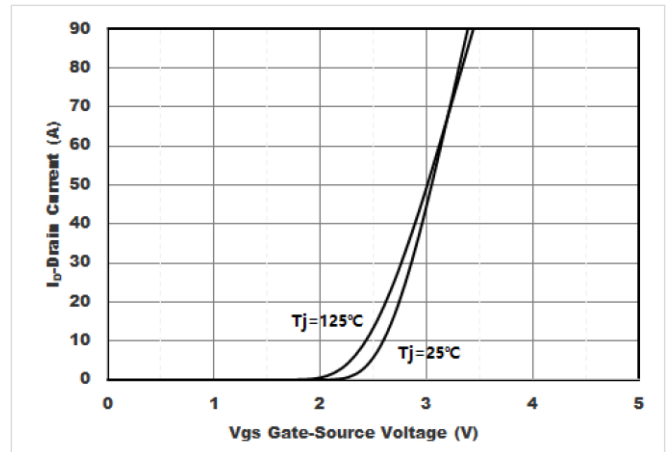


Figure2. Transfer Characteristics

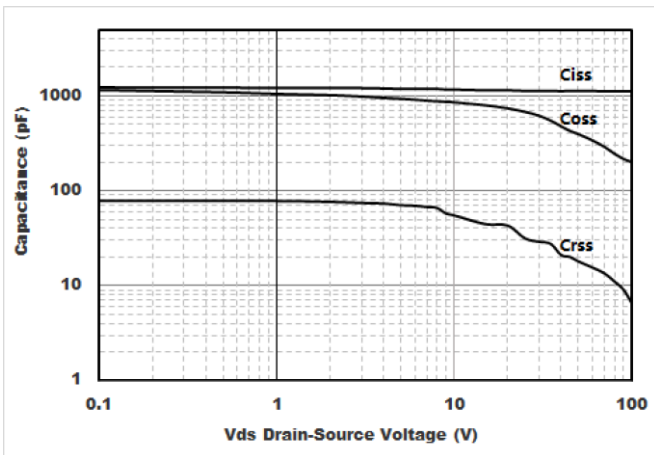


Figure3. Capacitance Characteristics

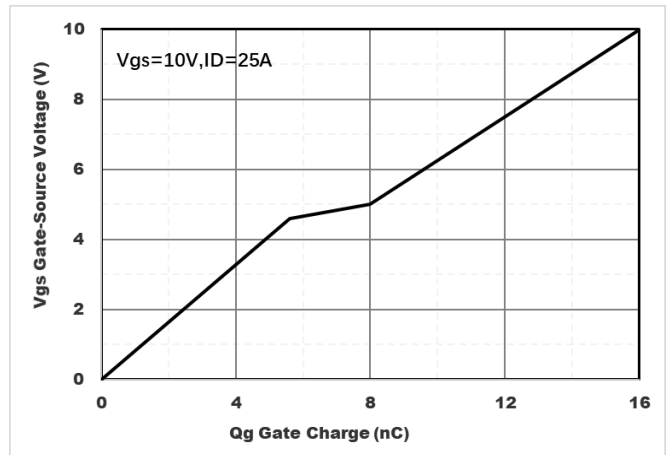


Figure4. Gate Charge

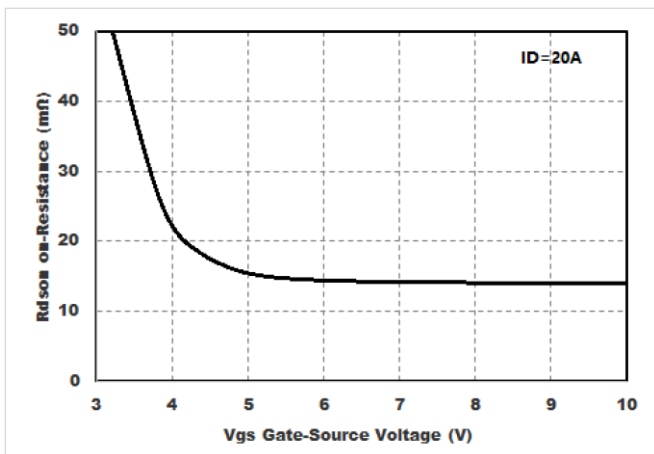


Figure5. : On-Resistance vs. Drain Current and Gate Voltage

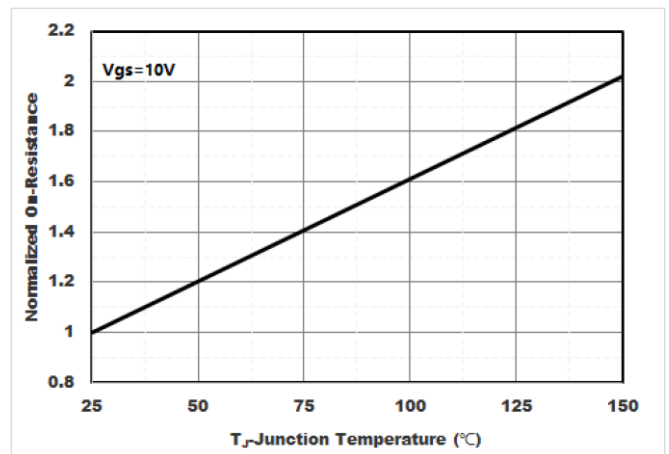


Figure6. Normalized On-Resistance

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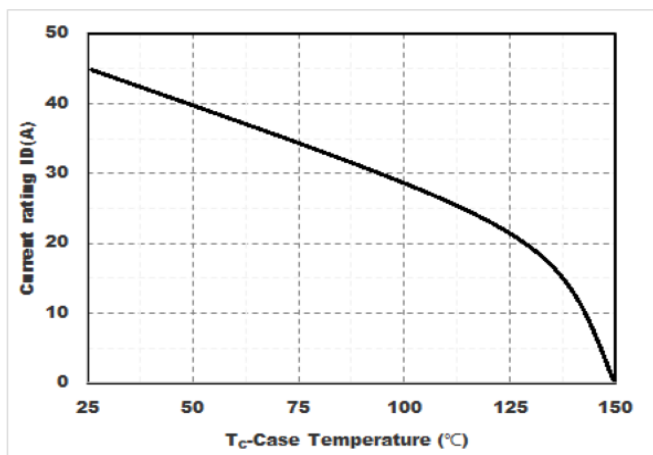


Figure7. Drain current

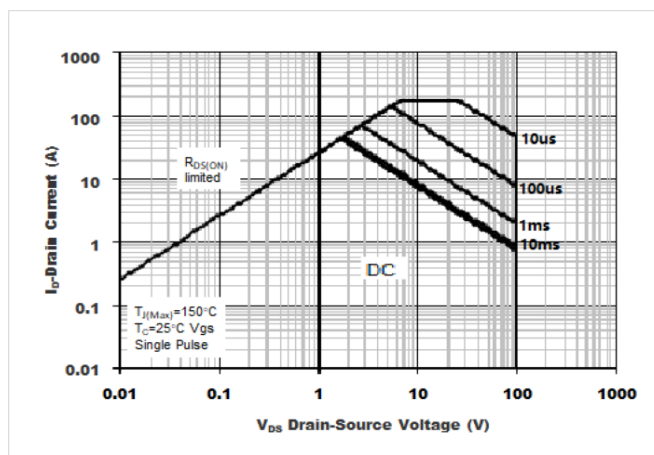


Figure8.Safe Operation Area

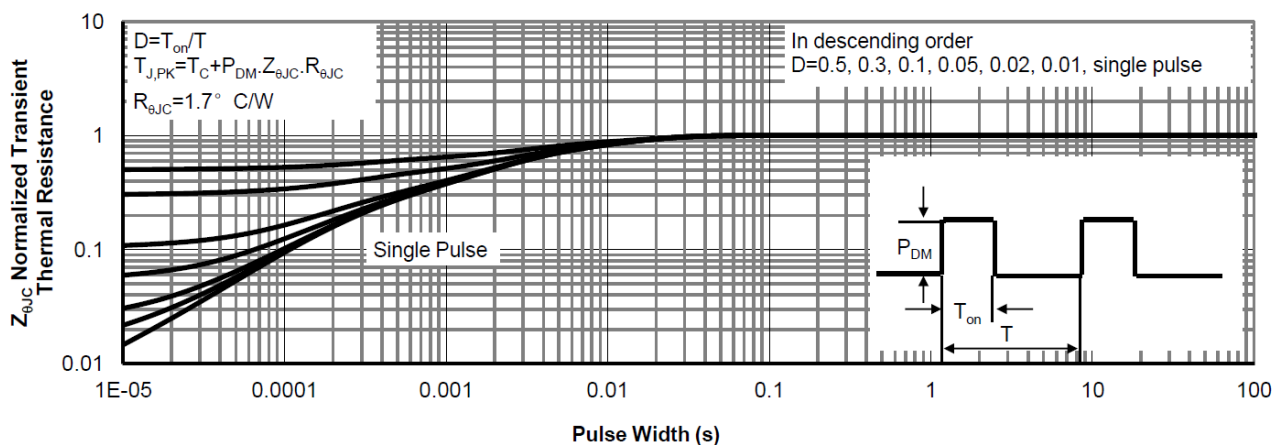
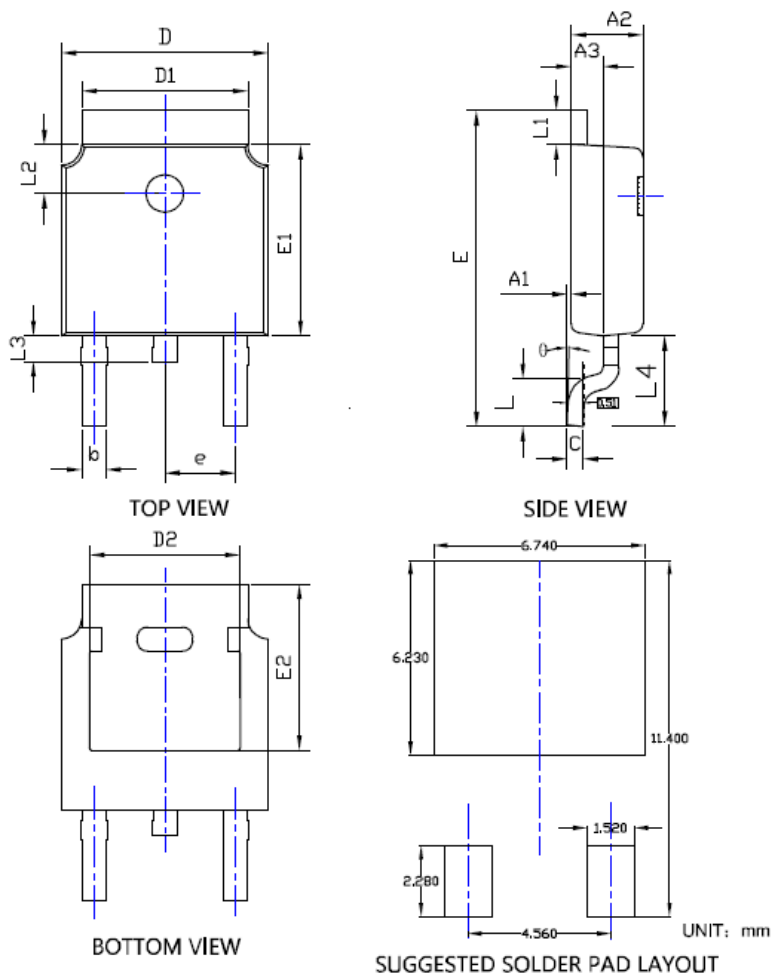


Figure9.Normalized Maximum Transient thermal impedance

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■ TO-252 Package information



SYMBOL	DIMENSIONS					
	INCHES			Millimeter		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A1	0.000	---	0.008	0.000	---	0.200
A2	0.087	0.091	0.094	2.200	2.300	2.400
A3	0.035	0.039	0.043	0.900	1.000	1.100
b	0.026	0.030	0.034	0.660	0.760	0.860
c	0.018	0.020	0.023	0.460	0.520	0.580
D	0.256	0.260	0.264	6.500	6.600	6.700
D1	0.203	0.209	0.215	5.150	5.300	5.450
D2	0.181	0.189	0.195	4.600	4.800	4.950
E	0.390	0.398	0.406	9.900	10.100	10.300
E1	0.236	0.240	0.244	6.000	6.100	6.200
E2	0.203	0.209	0.215	5.150	5.300	5.450
e	0.090BSC			2.286BSC		
L	0.049	0.059	0.069	1.250	1.500	1.750
L1	0.035	---	0.050	0.900	---	1.270
L2	0.055	---	0.075	1.400	---	1.900
L3	0.240	0.310	0.039	0.600	0.800	1.000
L4	0.114REF			2.900REF		
θ	0°	---	10°	0°	---	10°