CRMKC65R380A

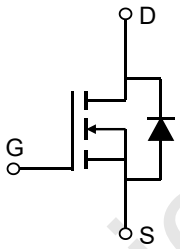
N-Channel 650V, 13A Super-Junction MOSFET

Description

Features

- 650V， 13A

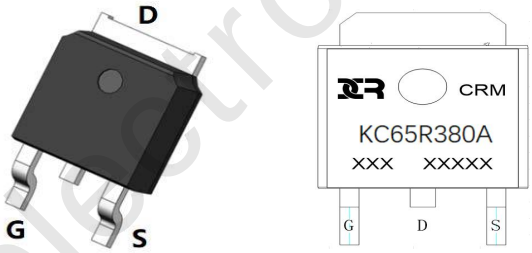
  $R_{DS(ON)}$ Typ = 330mΩ @ V_{GS} = 10V
- Low FOM RDS(ON)×QG
- Extremely low losses due to very low Eon and Eoff
- Qualified for industrial grade applications according to JEDEC
- Excellent stability and uniformity



Schematic Diagram

Application

- SMPS
- Adapter
- LED lighting
- EV Charger
- Telecom power
- Solar Inverter



Marking and Pin Assignment

Package Marking and Ordering Information

Device	Marking	Package	Outline	Reel Size	Reel (pcs)	Per Carton (pcs)
CRMKC65R380A	CRMKC65R380A	TO-252-3L	TAPING	13"	2500	25000

Absolute Maximum Ratings (@ T_J = 25°C unless otherwise noted)

Symbol	Parameter	Conditions	Value	Units
I_D	Continuous drain current (1)	T_C = 25 °C	13	A
		T_C = 100 °C	8	A
I_D,pulse	Pulsed drain current (2)	T_C = 25 °C	24	A
E_{AS}	Avalanche energy, single pulse	V_{DD}=50V;I_d=3.4A	320	mJ
I_{AS}	Avalanche current, single pulse	-	3.4	A
dv/dt	MOSFET dv/dt ruggedness	V_{DS}=0...400V	50	V/ns
V_{GS}	Gate source voltage (static)		±20	V
V_{GS}	Gate source voltage (dynamic)	AC (f>1 Hz)	±30	V
P_{tot}	Power dissipation	T_C = 25 °C	63	W
T_j,T_{stg}	Operating and Storage temperature	-	-55 to 150	°C
I_s	Continuous diode forward current	T_C = 25 °C	11	A
I_S,pulse	Diode pulse current	T_C = 25 °C	25	A
dv/dt	Reverse diode dv/dt	V_{DS}=0...400V,I_{SD}<= 7A	15	V/ns

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.9	°C / W
$R_{\theta JA}$	Thermal Resistance, Junction-to- Ambient	62	°C / W

Static Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS}=0V, I_D=1mA	650	-	-	V
$V_{(GS)th}$	Gate threshold voltage	V_{DS}=V_{GS},I_D=0.25mA	3	3.5	4	V
I_{DSS}	Zero gate voltage drain current	V_{DS}=650V,V_{GS}=0V,T_j=25°C	-	-	1	μA
I_{GSS}	Gate-source leakage current	V_{GS}=±30V,V_{DS}=0V	-	±2	±100	nA
$R_{DS(on)}$	Drain-source on-state resistance	V_{GS}=10V,I_D=7A,T_j=25°C	-	0.33	0.38	Ω
		V_{GS}=10V,I_D=7A,T_j=150°C	-	0.66	-	Ω
R_G	Gate resistance	f=1MHz,open drain	-	9	-	Ω

Dynamic Characteristics

C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=50V, f=100kHz	-	410	-	pF
C_{oss}	Output Capacitance		-	49	-	pF
C_{rss}	Reverse Transfer Capacitance		-	3.9	-	pF
Q_g	Gate charge total	V_{DD}=400V I_D=5A V_{GS}=0 to 10V	-	19	-	nC
Q_{gs}	Gate to source charge		-	4.1	-	nC
Q_{gd}	Gate to drain charge		-	9	-	nC
$V_{plateau}$	Gate plateau voltage		-	6	-	V

Switching Characteristics

$t_{d(on)}$	Turn-On DelayTime	V_{DD}=400V V_{GS}=15V I_D=5A R_G=10Ω	-	21	-	ns
t_r	Turn-On Rise Time		-	12	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	36	-	ns
t_f	Turn-Off Fall Time		-	13	-	ns

Diode Recovery Characteristics

Irrm	Peak reverse recovery current		-	13	-	A
V_{SD}	Drain to Source Diode Forward Voltage	VR=400V IF=5A diF/dt=100A/μs	-	-	1.3	V
trr	Body Diode Reverse Recovery Time		-	190	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	2	-	μC

Notes: 1. Limited by Tj,max. Maximum Duty Cycle D = 0.50

2. Pulse width tp limited by Tj,max

Typical Performance Characteristics

Fig.1 Typical Output characteristics (25°C)

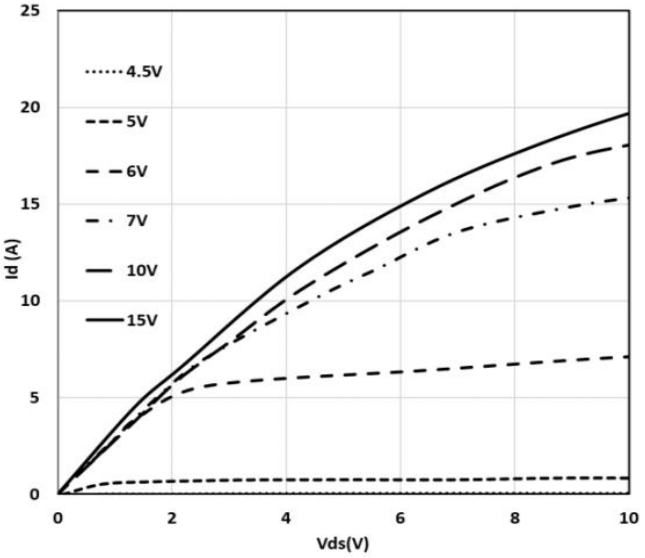


Fig.2 Transfer characteristics

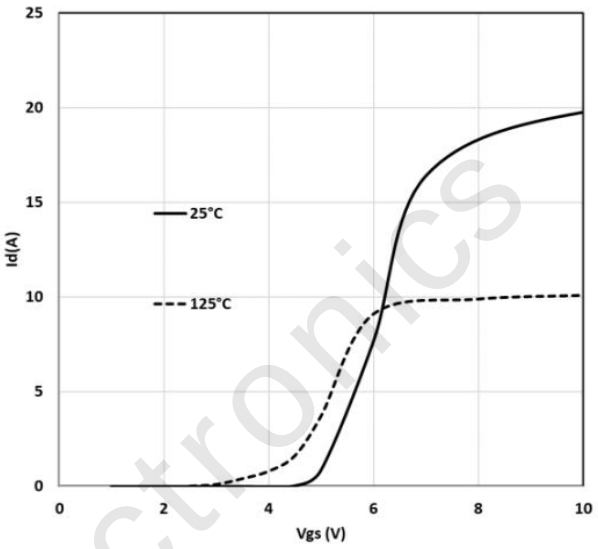


Fig.3 Safe Operating Area

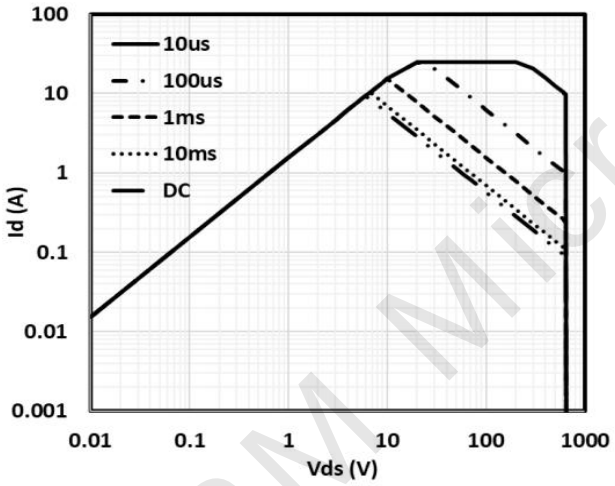


Fig.4 Power dissipation

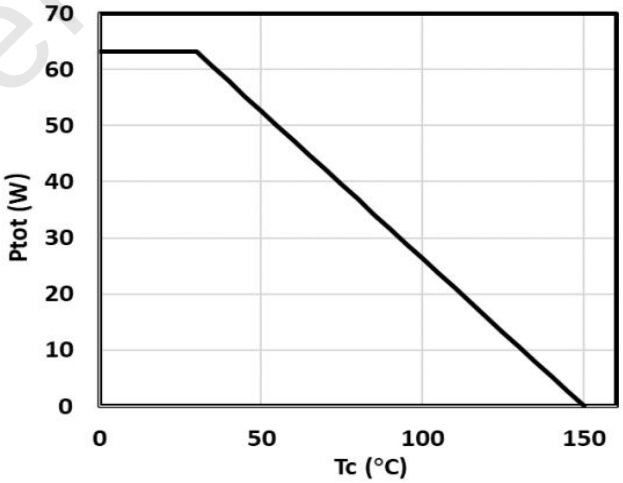


Fig.5 Gate charge

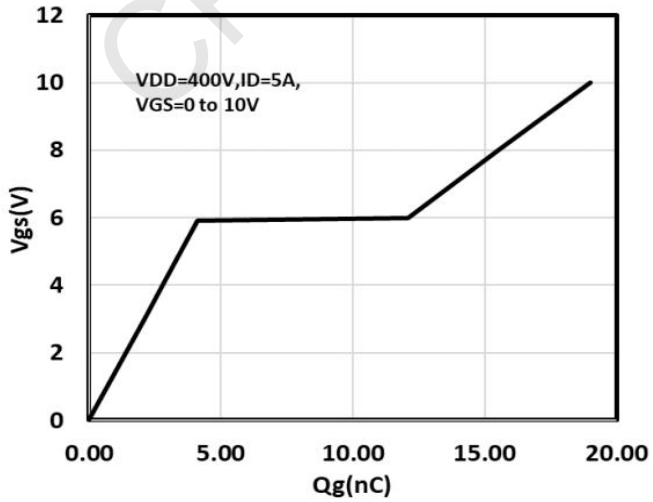
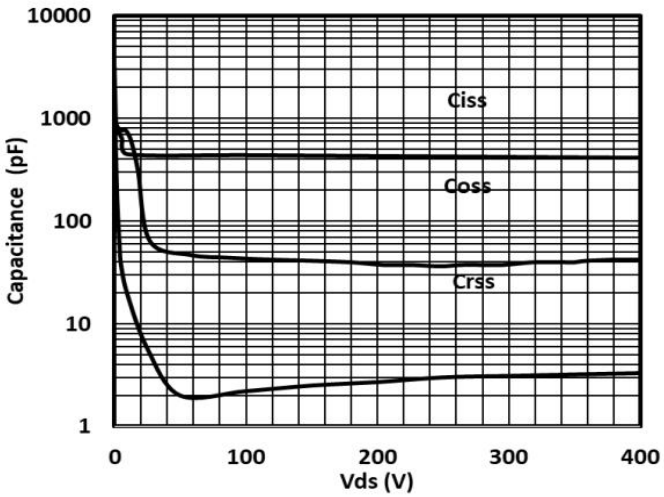


Fig.6 Typical capacitance characteristics



Typical Performance Characteristics

Fig.7 On Resistor vs. Junction temperature

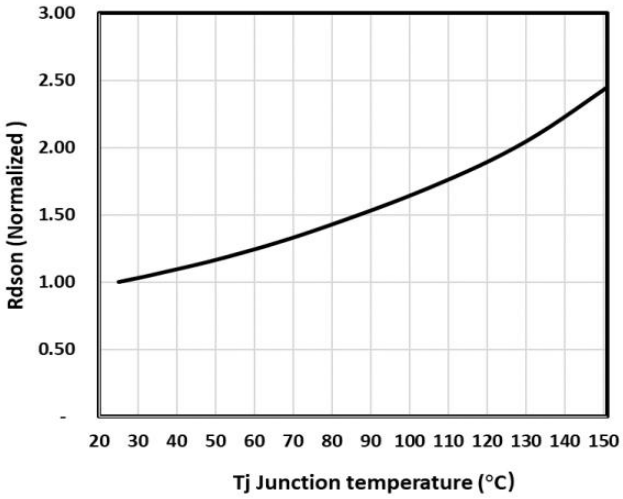
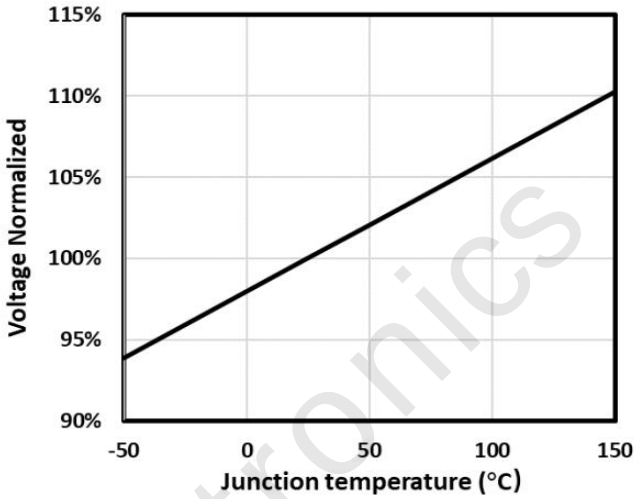
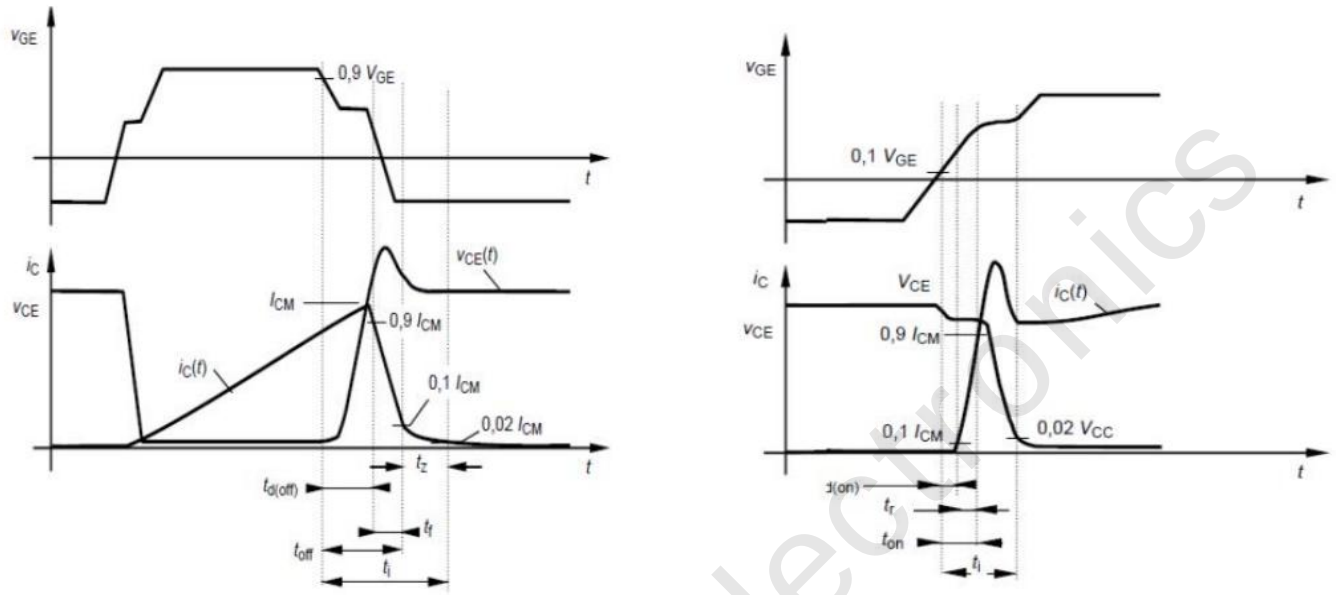


Fig.8 Drain-Source Breakdown Voltage

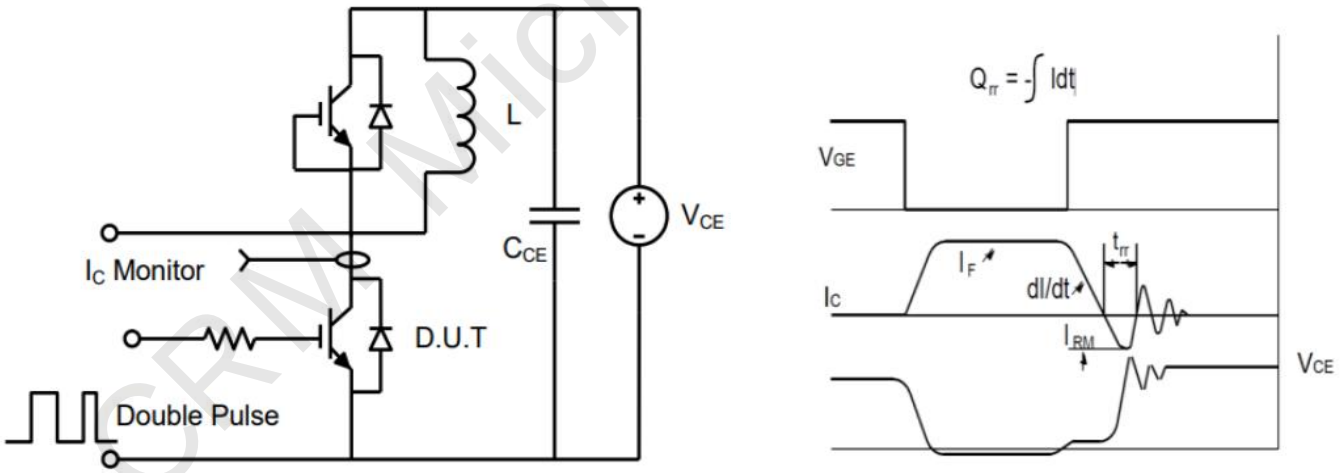


Test Circuit

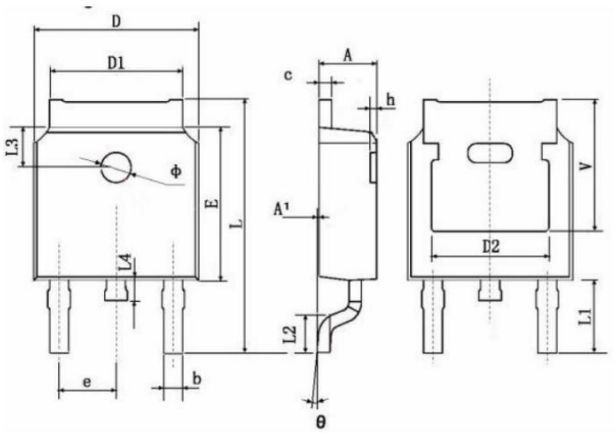
Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Mechanical Data(TO-252-3L)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.250	2.350	0.089	0.093
A1	0.050	0.150	0.002	0.006
b	0.660	0.860	0.026	0.034
c	0.458	0.558	0.018	0.022
D	6.550	6.650	0.259	0.263
D1	5.234	5.434	0.207	0.215
D2	4.826 TYP.		0.191 TYP.	
E	6.050	6.150	0.239	0.243
e	2.236	2.336	0.088	0.092
L	9.820	10.220	0.388	0.404
L1	3.000 TYP.		0.119 TYP.	
L2	1.400	1.600	0.055	0.063
L3	1.800 TYP.		0.071 TYP.	
L4	0.700	0.900	0.028	0.036
Φ	1.150	1.250	0.045	0.049
θ	0°	3°	0°	3°
h	0.000	0.300	0.000	0.012
V	5.399 TYP		0.213 TYP	

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