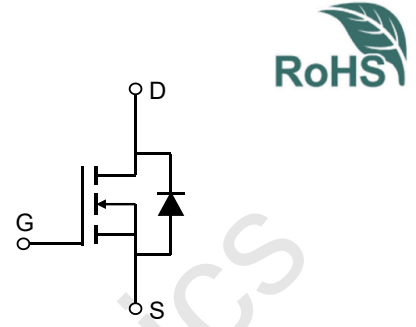


Description

Features

- 650V, 14A
 $R_{DS(ON)}$ Typ = 250m Ω @ $V_{GS} = 10V$
- Low FOM $R_{DS(ON)} \times Q_G$
- Extremely low losses due to very low E_{on} and E_{off}
- 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)
CRMKC65R290A	CRMKC65R290A	TO-252-3L	TAPING	13"	2500	25000

Absolute Maximum Ratings (@ $T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Value	Units
I_D	Continuous drain current ⁽¹⁾	$T_C = 25^\circ\text{C}$	14	A
		$T_C = 100^\circ\text{C}$	9	A
$I_{D,pulse}$	Pulsed drain current ⁽²⁾	$T_C = 25^\circ\text{C}$	25	A
E_{AS}	Avalanche energy, single pulse	$V_{DS}=50V; I_d=3.4A$	300	mJ
I_{AS}	Avalanche current, single pulse	-	3.4	A
dv/dt	MOSFET dv/dt ruggedness	$V_{DS}=0\ldots400V$	50	V/ns
V_{GS}	Gate source voltage (static)		± 20	V
V_{GS}	Gate source voltage (dynamic)	AC ($f > 1\text{ Hz}$)	± 30	V
P_{tot}	Power dissipation	$T_C = 25^\circ\text{C}$	63	W
T_J, T_{stg}	Operating and Storage temperature	-	-55 to 150	$^\circ\text{C}$
I_S	Continuous diode forward current	$T_C = 25^\circ\text{C}$	11	A
$I_{S,pulse}$	Diode pulse current	$T_C = 25^\circ\text{C}$	25	A
dv/dt	Reverse diode dv/dt	$V_{DS}=0\ldots400V, I_{SD} \leq 7A$	15	V/ns

Thermal Characteristics

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

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	$V_{DS}=650V, V_{GS}=0V, T_j=25^{\circ}\text{C}$	-	-	1	μA
I_{GSS}	Gate-source leakage current	$V_{GS}=\pm 30V, V_{DS}=0V$	-	2	± 100	nA
$R_{DS(on)}$	Drain-source on-state resistance	$V_{GS}=10V, I_D=7A, T_j=25^{\circ}\text{C}$	-	250	290	m Ω
		$V_{GS}=10V, I_D=7A, T_j=150^{\circ}\text{C}$	-	63	-	m Ω
R_G	Gate resistance	$f=1\text{MHz}, \text{open drain}$	-	8	-	Ω

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{GS}=0V,$	-	450	-	pF
C_{oss}	Output Capacitance	$V_{DS}=50V,$	-	60	-	pF
C_{rss}	Reverse Transfer Capacitance	$f=100\text{kHz}$	-	4.3	-	pF
Q_g	Gate charge total		-	22	-	nC
Q_{gs}	Gate to source charge	$V_{DD}=400V$	-	5	-	nC
Q_{gd}	Gate to drain charge	$I_D=7A$	-	11	-	nC
$V_{plateau}$	Gate plateau voltage	$V_{GS}=0 \text{ to } 10V$	-	6	-	V

Switching Characteristics

$t_{d(on)}$	Turn-On DelayTime	$V_{DD}=400V$	-	20	-	ns
t_r	Turn-On Rise Time	$V_{GS}=15V$	-	13	-	ns
$t_{d(off)}$	Turn-Off DelayTime	$I_D=7A$	-	40	-	ns
t_f	Turn-Off Fall Time	$R_G=10\Omega$	-	15	-	ns

Diode Recovery Characteristics

I_{rrm}	Peak reverse recovery current		-	16	-	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_R=400V$	-	-	1.3	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F=7A$ $diF/dt=100A/\mu s$	-	220	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	2.2	-	μC

Notes:

1. Limited by $T_{j,max}$. Maximum Duty Cycle $D = 0.50$
2. Pulse width t_p limited by $T_{j,max}$

Typical Performance Characteristics

Fig.1 Typical Output characteristics (25°C)

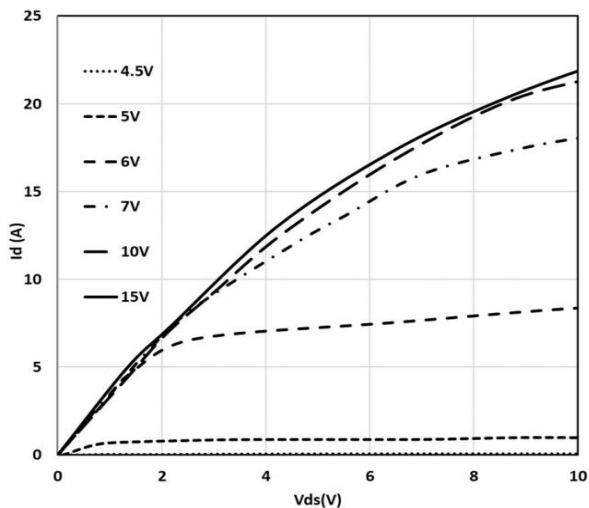


Fig.2 Transfer characteristics

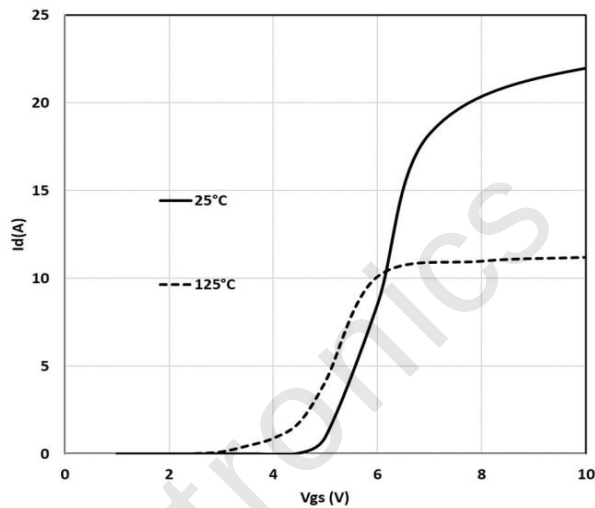


Fig.3 Safe Operating Area

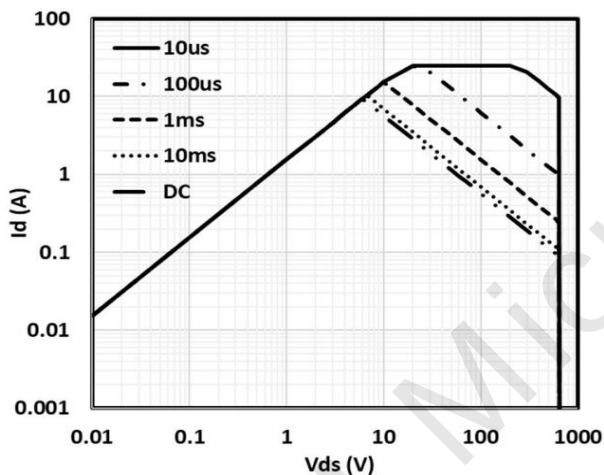


Fig.4 Power dissipation

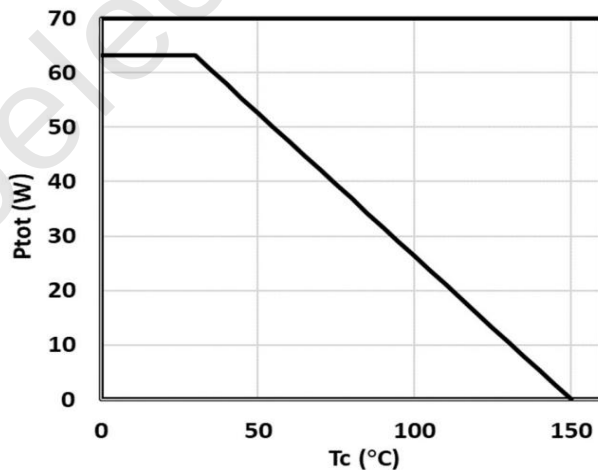


Fig.5 Gate charge

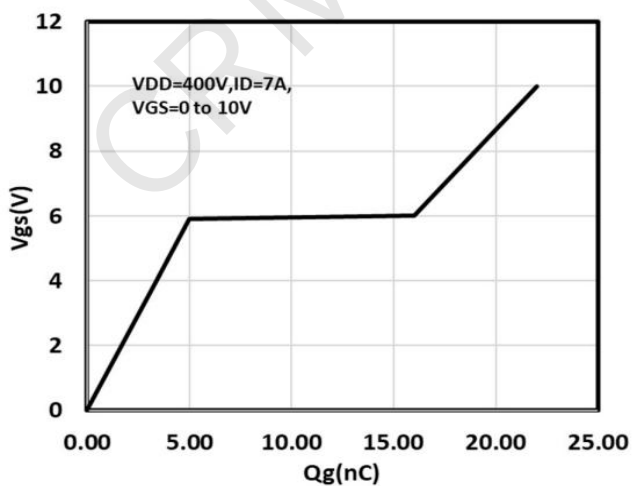
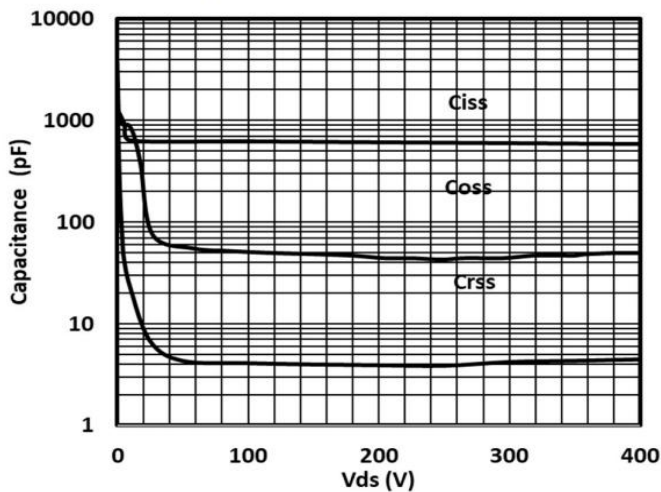


Fig.6 Typical capacitance characteristics



Typical Performance Characteristics

Fig.7 On Resistor vs. Junction temperature

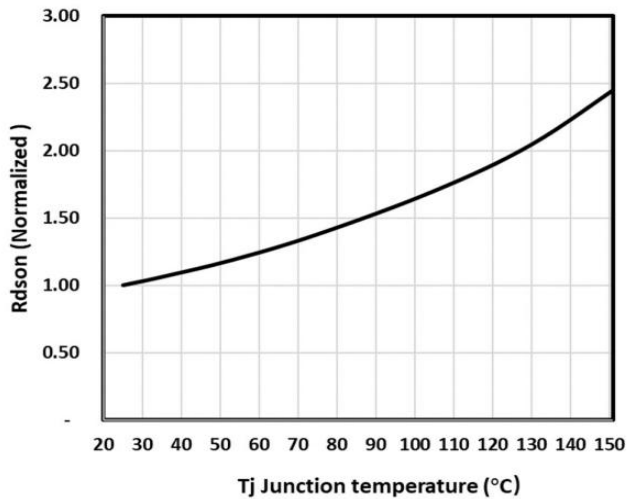
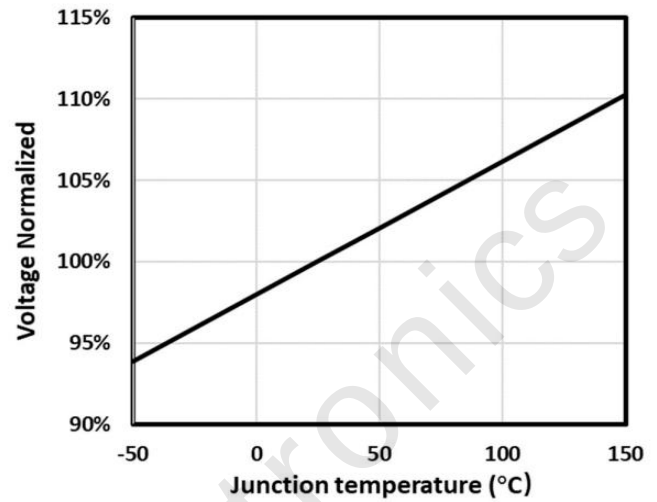


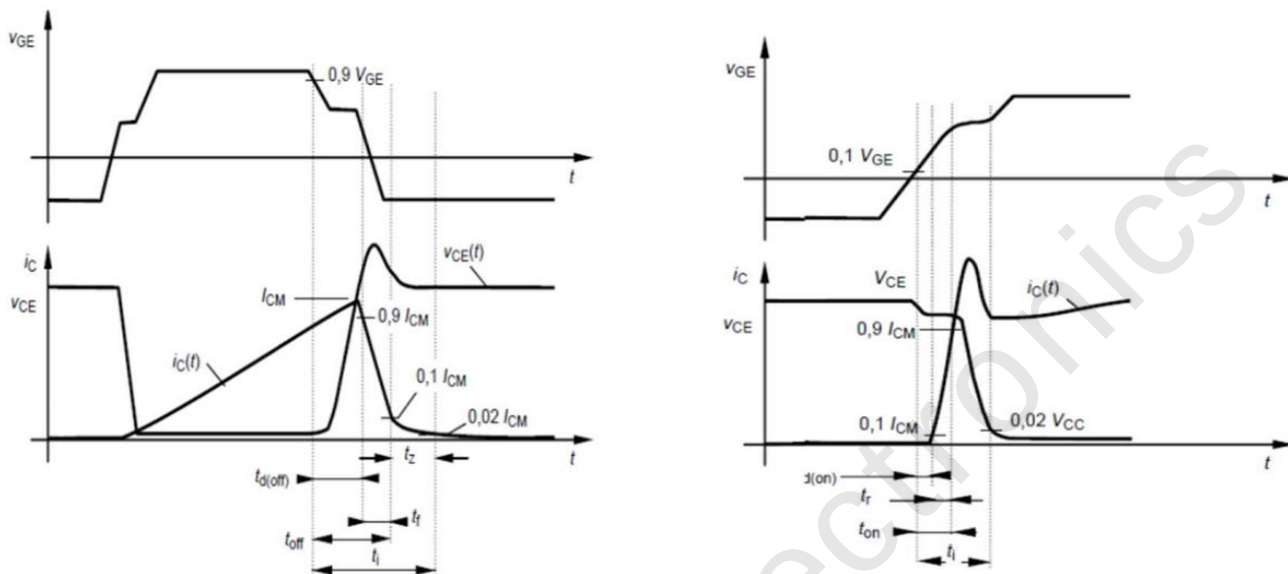
Fig.8 Drain-Source Breakdown Voltage



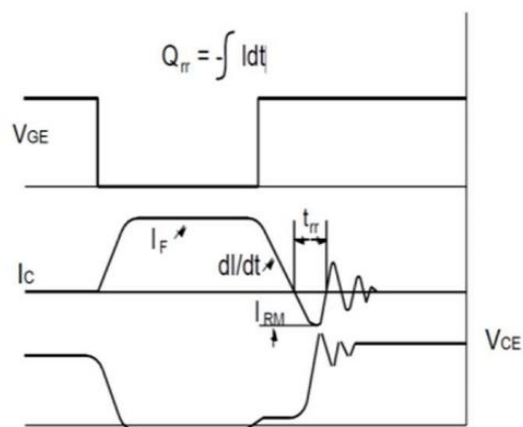
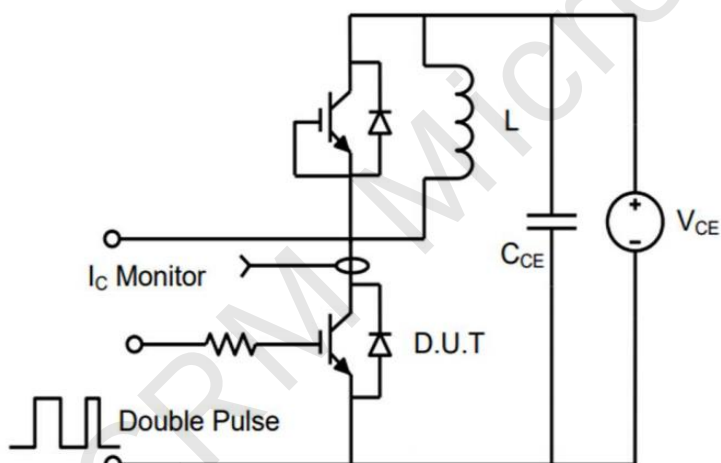
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Test Circuit

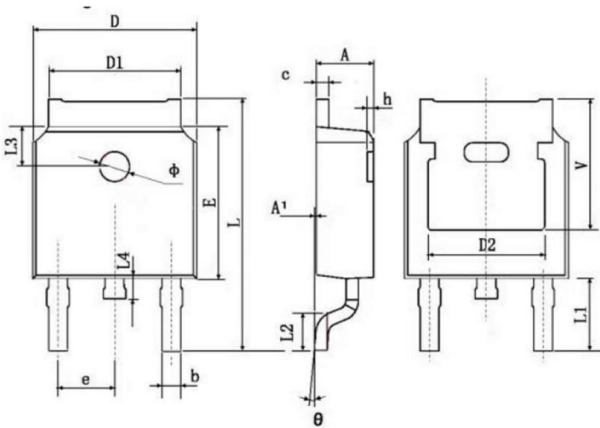
Switching Test Circuit & Waveforms



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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