

## Descriptions

This is super junction MOSFET that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. Suitable for applications which require superior power density and outstanding efficiency.

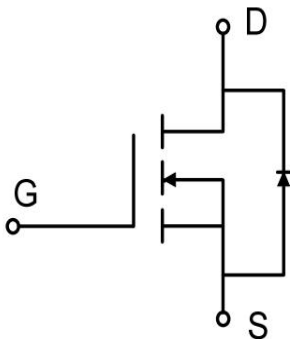
## Features

- $V_{DS} = 700V @ T_{j,max}$
- Typ.  $R_{DS(on)} = 0.033 \Omega$
- 100% UIS tested
- Pb-free plating, Halogen free

## Applications

- LED Lighting
- Charger
- Adapter
- PC
- LCD TV
- Server

## Equivalent Circuit & Pining



TO-247

## Marking

See Marking Instructions.

**Absolute Maximum Ratings(Ta=25°C)**

Parameter	Symbol	CT65R033HA	Unit
Drain-source voltage	VDSS	650	V
Continuous drain current <sup>1)</sup>	ID	( TC = 25°C )	80
		( TC = 100°C )	45
Pulsed drain current <sup>2)</sup>	IDM	245	A
Gate-source voltage	VGS	±30	V
Avalanche energy, single pulse <sup>3)</sup>	EAS	850	mJ
Avalanche energy, repetitive <sup>2)</sup>	EAR	1.2	mJ
Avalanche current, repetitive <sup>2)</sup>	IAR	6	A
Power dissipation ( TC = 25°C ) - Derate above 25°C	PD	410	W
		3.28	W/°C
Operating and storage temperature range	Tj, Tstg	-55 to +150	°C
Continuous diode forward current	IS	80	A
Diode pulse current	IS,pulse	245	A

**Thermal Characteristics**

Parameter	Symbol	CT65R033HA	Unit
Thermal resistance, junction-to-case	RθJC	0.3	°C/W
Thermal resistance, junction-to-ambient	R JA	62	°C/W

Electrical Characteristics(Ta=25°C)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static characteristics</b>						
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=1mA$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=0.25mA$	2.3	3.3	4.3	V
Drain cut-off current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V,$ $T_j = 25^\circ C, T_j = 125^\circ C$	-	-100	10	$\mu A$
Gate leakage current, forward	$I_{GSSF}$	$V_{GS}=20V, V_{DS}=0V$	-	-	300	nA
Gate leakage current, reverse	$I_{GSSR}$	$V_{GS}=-20V, V_{DS}=0V$	-	-	-300	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$ $T_j = 25^\circ C$	-	0.033	0.039	$\Omega$
<b>Dynamic characteristics</b>						
Input capacitance	$C_{iss}$	$V_{DS}= 100V, V_{GS}= 0V,$ $f = 1MHz$	-	6070	-	pF
Output capacitance	$C_{oss}$		-	220	-	
Reverse transfer capacitance	$C_{rss}$		-	3.5	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 300V, I_D = 30A$ $R_G = 25\Omega, V_{GS}=10V$	-	64	-	ns
Rise time	$t_r$		-	69	-	
Turn-off delay time	$t_{d(off)}$		-	307	-	
Fall time	$t_f$		-	56	-	
<b>Gate charge characteristics</b>						
Gate to source charge	$Q_{gs}$	$V_{DD}=480V, I_D=30A,$ $V_{GS}=0 to 10V$	-	26.2	-	nC
Gate to drain charge	$Q_{gd}$		-	30.1	-	
Gate charge total	$Q_g$		-	103	-	
Gate plateau voltage	$V_{plateau}$		-	5.0	-	V
<b>Reverse diode characteristics</b>						
Diode forward voltage	$V_{SD}$	$V_{GS}=0V, I_F=30A$	-	-	1.2	V
Reverse recovery time	$t_{rr}$	$V_R=50V, I_F=30A,$ $di_F/dt=100A/\mu s$	-	375	-	ns
Reverse recovery charge	$Q_{rr}$		-	7.2	-	$\mu C$
Peak reverse recovery current	$I_{rrm}$		-	38	-	A

Notes:

- Limited by  $T_{jmax}$ . Maximum duty cycle  $D=0.5$ .
- Repetitive rating: pulse width limited by maximum junction temperature.
- $I_{AS} = 2.5A, V_{DD} = 50V, R_G = 25\Omega,$  starting  $T_j = 25^\circ C$

Electrical Characteristic Curve

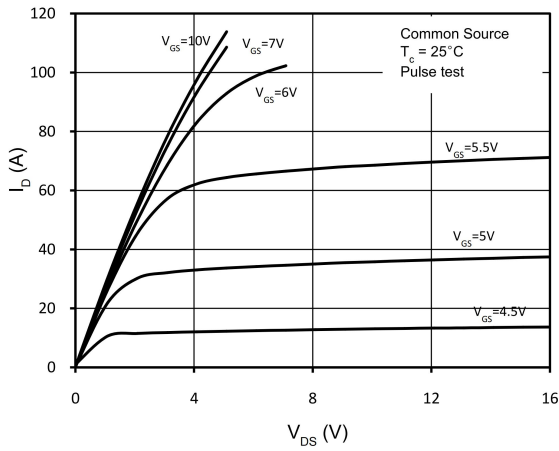


Figure 1. On-Region Characteristics

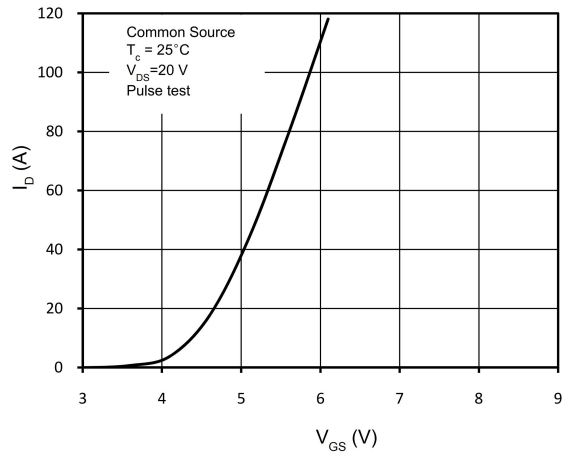


Figure 2. Transfer Characteristics

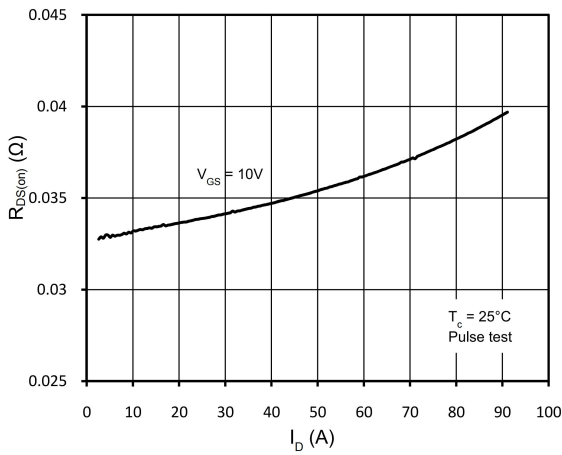


Figure 3. Static Drain-Source On Resistance

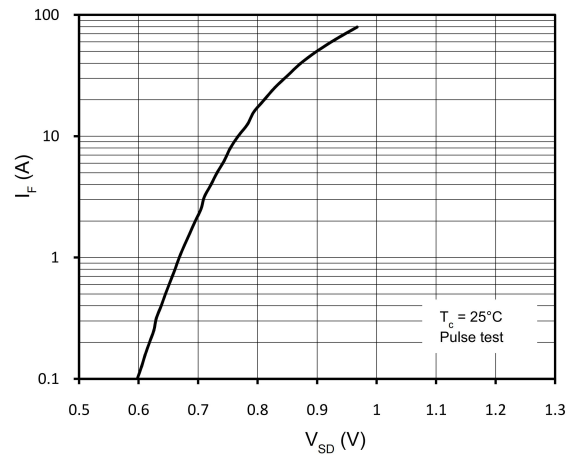


Figure 4. Body-Diode Forward Characteristics

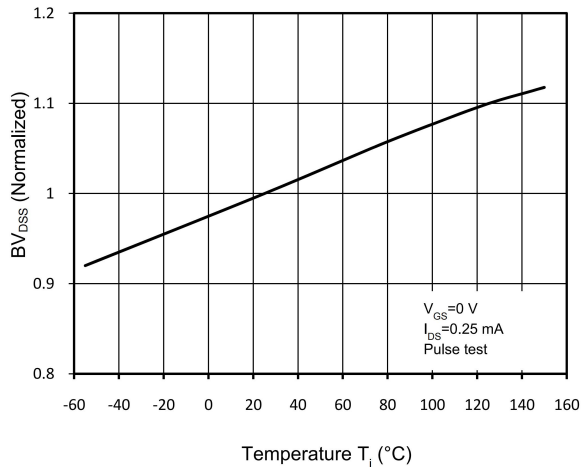


Figure 5. Normalized  $BV_{DSS}$  vs. Temperature

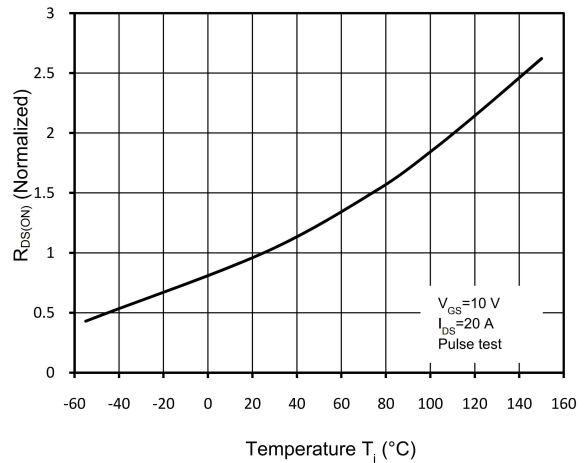


Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

Electrical Characteristic Curve

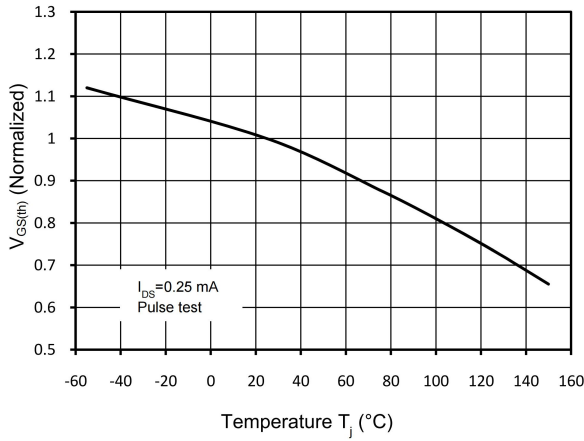


Figure 7. Threshold Voltage vs. Temperature

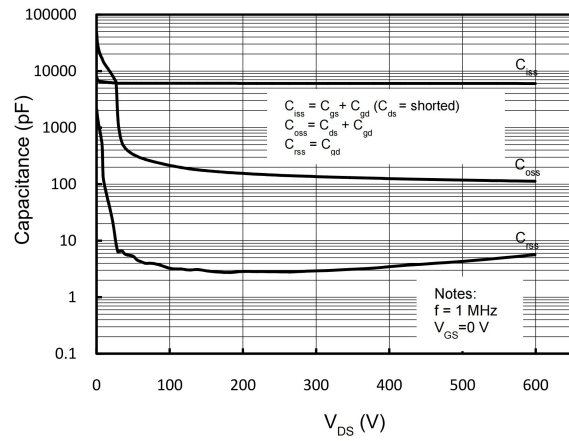


Figure 8. Capacitance Characteristics

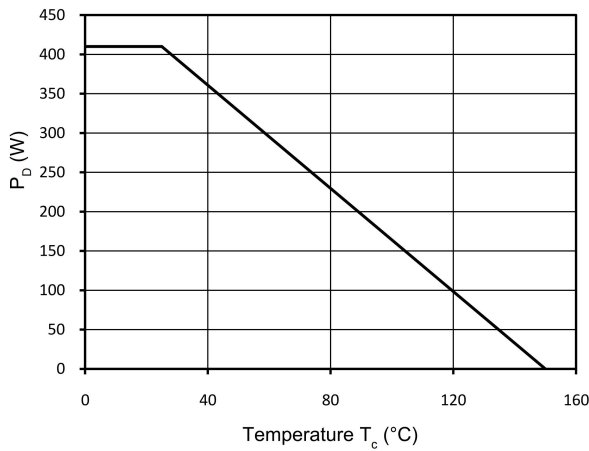


Figure 9. Power Dissipation

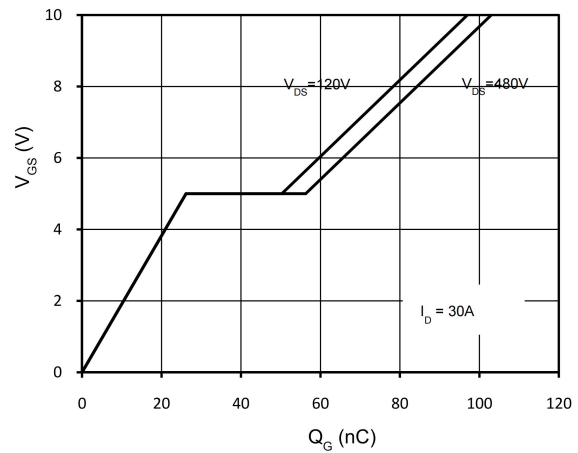


Figure 10. Gate Charge Characteristics

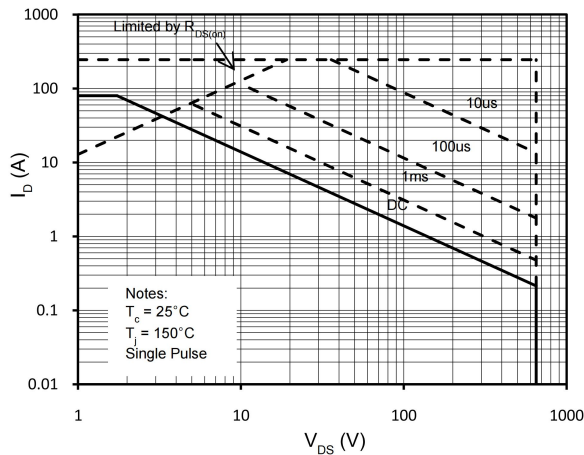


Figure 11. Maximum Safe Operating Area

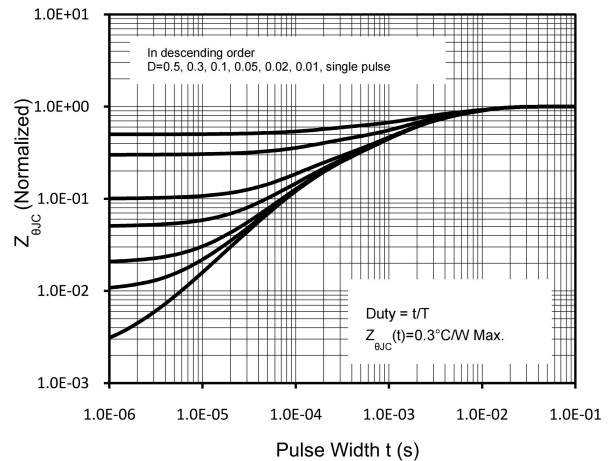
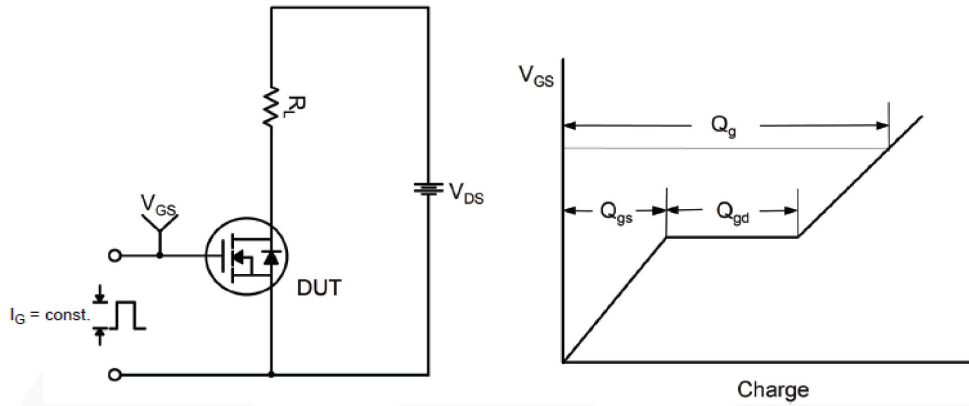


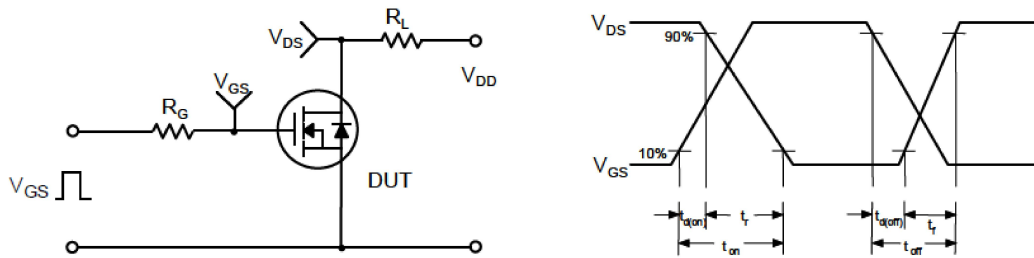
Figure 12. Transient Thermal Response Curve

**Test Circuit**

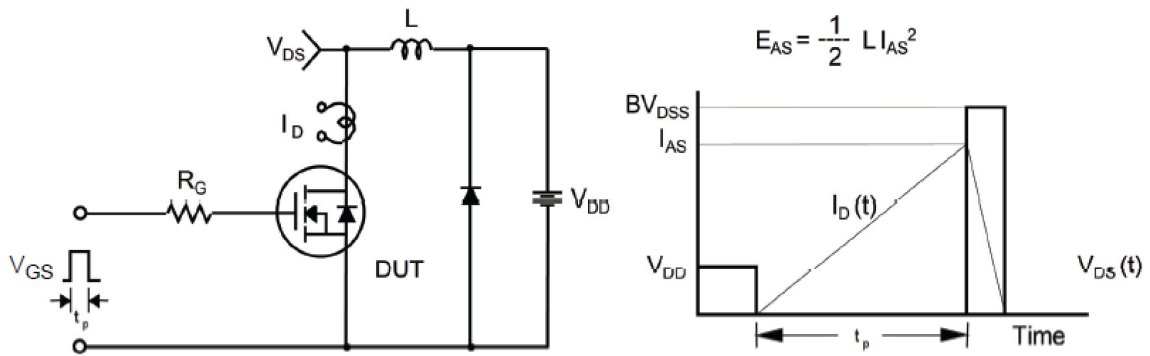
**Gate Charge Test Circuit & Waveform**



**Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching Test Circuit & Waveforms**



## Marking codes

**COT**  
**65R033**  
**\*\*\*\*\***

Note:

COT: Company Code

65R033: Product Type.

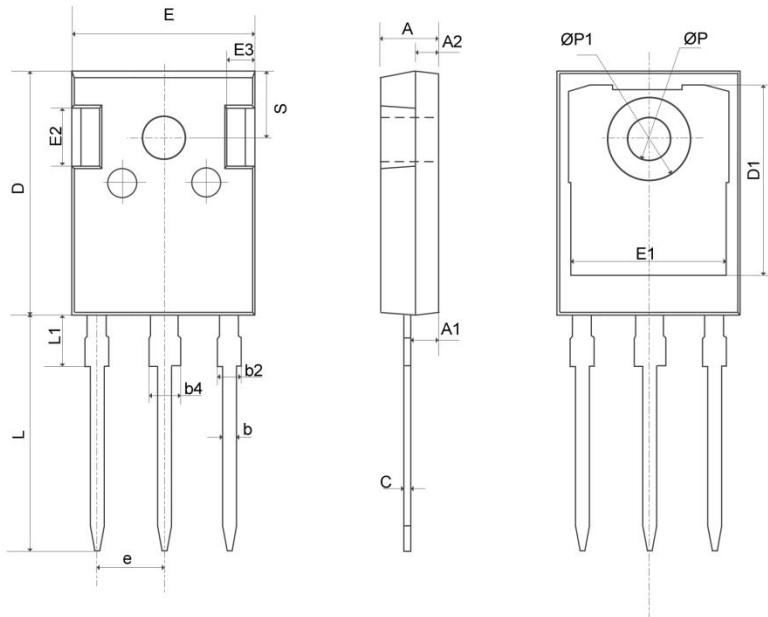
\*\*\*\*\*: \*: Inner Code \* : Year Code \*\*: Week Code \*\*: Lot Code.

## Ordering Information

Part	Package	Marking	Packing method
CT65R033HA	TO-247	65R033	Tube

**Mechanical Dimensions for TO-247**

**COMMON DIMENSIONS**



SYMBOL	MM	
	MIN	MAX
A	4.80	5.21
A1	2.21	2.61
A2	1.85	2.16
b	1.07	1.36
b2	1.91	2.41
b4	2.87	3.38
c	0.51	0.75
D	20.70	21.30
D1	16.25	17.65
E	15.50	16.13
E1	12.38	13.60
E2	3.68	5.20
E3	1.00	2.70
e	5.44BSC	
L	19.62	20.32
L1	—	4.40
ØP	3.40	3.80
ØP1	—	7.30
S	6.15BSC	