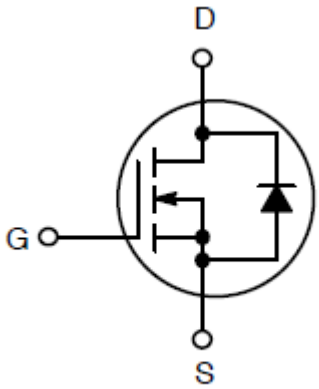
N-channel 650V, 32mΩ typ.,
Super Junction MOSFET T4 in TO-247

Datasheet - production data

1. Descriptions

TO-247

N-Channel MOSFET



POWER MOSFET

Key Performance Parameters

Parameters	Value	Unit
BV_{DSS}	650	V
$R_{DS(on),max}$	37	mΩ
$Q_{g,typ}$	133	nC
$I_{D,pulse}$	240	A
E_{AS}	2025	mJ

Features

• Extremely low losses due to very low FOM Rdson*Qg and Eoss.
• Very high commutation ruggedness.
• Qualified for industrial grade applications according to JEDEC.
• 100% UIS Tested.

Applications

• PC power.
• Server power supply.
• Telecom.
• Solar invertor.
• Super charger for automobiles.

Type/Ordering Code	Package	Marking	Related Links
CPW65R037T4	TO-247	65R037T4	See Appendix A

Contents

2. Maximum Ratings

at T_j = 25°C, unless otherwise specified

Table 1. Absolute Maximum Ratings

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
V_{DS}	Drain-source voltage[1]	-	-	650	V	V_{GS}=0V, I_D=250μA
I_D	Continuous drain current[2]	- -	- -	80 51	A	T_C=25°C T_C=100°C
$I_{D,pulse}$	Pulsed drain current	-	-	240	A	T_C=25°C
E_{AS}	Avalanche energy, single pulse[3]	-	-	2025	mJ	I_D=9A; V_{DD} =100V
V_{GS}	Gate source voltage	-30	-	30	V	static; AC (f>1 Hz)
P_{tot}	Power dissipation	-	-	500	W	T_C=25°C
T_j, T_{stg}	Operating and storage temperature	-55	-	150	°C	-
I_S	Continuous diode forward current	-	-	80	A	T_C=25°C
$I_{S,pulse}$	Diode pulse current[2]	-	-	240	A	T_C=25°C
dv/dt	MOSFET dv/dt ruggedness	-	-	50	V/ns	V_{DS} =0...400V
dv/dt	Reverse diode dv/dt[4]	-	-	15	V/ns	V_{DS}=0...400V, I_{SD}<=I_S, Tj=25°C

1) Limited by T_j max. Maximum duty cycle D=0.75.
2) Pulse width t_p limited by T_j,max.
3) V_{DD}=100V, R_G=25Ω, Starting T_j=25°C.
4) V_{DClink}=400V; $V_{DS,peak}$<$V_{(BR)DSS}$; identical low side and high side switch with identical R_G

3. Thermal Characteristics

Table 2. Thermal Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
R_{thJC}	Thermal resistance, junction - case	-	-	0.25	°C/W	T_C = 25°C
R_{thJA}	Thermal resistance, junction - ambient	-	-	62	°C/W	T_C = 25°C
T_{sold}	Soldering temperature, wavesoldering only allowed at leads	-	-	260	°C	Lead Temperature (Soldering, 10 sec)

4. Electrical Characteristics

at Tj = 25°C, unless otherwise specified

Table 3. Static Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
$V_{(BR)DSS}$	Drain-source breakdown voltage	650	-	-	V	V_{GS}=0V, I_D=250μA
$V_{(GS)th}$	Gate threshold voltage	2.5	3.0	4.5	V	V_{DS}=V_{GS}, I_D=250μA
I_{DSS}	Zero gate voltage drain current	-	-	10	μA	V_{DS}=650V, V_{GS}=0V, T_j=25°C
I_{GSS}	Gate-source leakage current	-	-	±100	nA	V_{GS}=±30V, V_{DS}=0V
$R_{DS(on)}$	Drain-source on-state resistance	-	32	37	mΩ	V_{GS}=10V, I_D=40A, T_j=25°C
R_G	Gate resistance	-	2.5	-	Ω	V_{DD}=0V,V_{GS}=0V,F=1MHz

Table 4. Dynamic Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
C_{iss}	Input capacitance	-	7500	-	pF	V_{GS}=0V, V_{DS}=50V, f=100KHz
C_{oss}	Output capacitance	-	340	-	pF	V_{GS}=0V, V_{DS}=50V, f=100KHz
C_{rss}	Reverse transfer capacitance	-	9	-	pF	V_{GS}=0V, V_{DS}=50V, f=100KHz
$C_{o(er)}$	Effective output capacitance, energy related[1)]	-	208	-	pF	V_{GS}=0V, V_{DS}=0 to 480V
$C_{o(tr)}$	Effective output capacitance, time related[2)]	-	1030	-	pF	V_{GS}=0V, V_{DS}=0 to 480V
$t_{d(on)}$	Turn-on delay time	-	25	-	ns	V_{DD}=400V, V_{GS}=10V, I_D=40A
t_r	Rise time	-	6	-	ns	V_{DD}=400V, V_{GS}=10V, I_D=40A
$t_{d(off)}$	Turn-off delay time	-	161	-	ns	V_{DD}=400V, V_{GS}=10V, I_D=40A
t_f	Fall time	-	7	-	ns	V_{DD}=400V, V_{GS}=10V, I_D=40A

Table 5. Gate Charge Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Q_{gs}	Gate to source charge	-	23	-	nC	V_{DD}=400V, I_D=40A, V_{GS}=0 to 10V
Q_{gd}	Gate to drain charge	-	40	-	nC	V_{DD}=400V, I_D=40A, V_{GS}=0 to 10V
Q_g	Gate charge total	-	140	-	nC	V_{DD}=400V, I_D=40A, V_{GS}=0 to 10V
$V_{plateau}$	Gate plateau voltage	-	3.4	-	V	V_{DD}=400V, I_D=40A, V_{GS}=0 to 10V

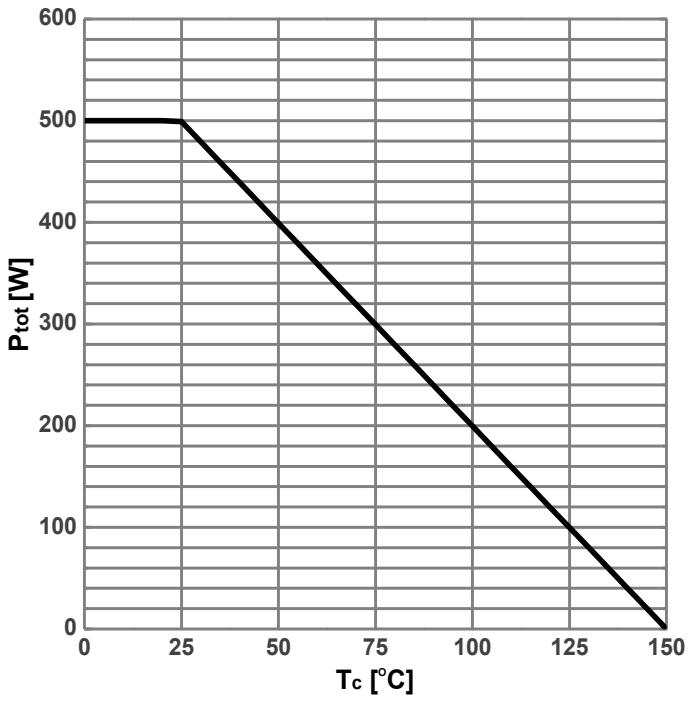
1) $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 480V.
2) $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 480V.

Table 6. Reverse Diode Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
V_{SD}	Diode forward voltage	-	0.85	-	V	V_{GS}=0V, I_F=40A, T_f=25°C
t_{rr}	Reverse recovery time	-	500	-	ns	V_R=400V, I_F=40A, di_F/dt=150A/μs
Q_{rr}	Reverse recovery charge	-	9.3	-	μC	V_R=400V, I_F=40A, di_F/dt=150A/μs
I_{rrm}	Peak reverse recovery current	-	32	-	A	V_R=400V, I_F=40A, di_F/dt=150A/μs

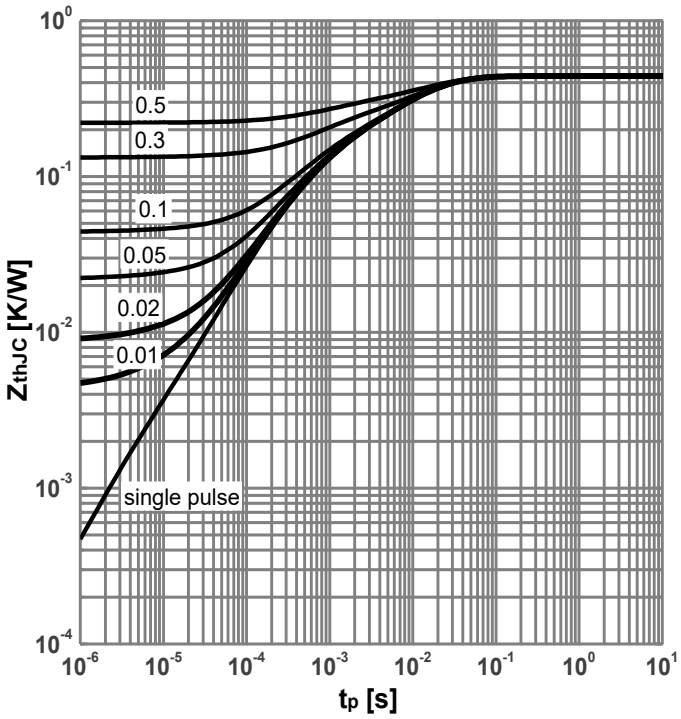
5. Electrical Characteristics Diagrams

Diagram 1: Power dissipation



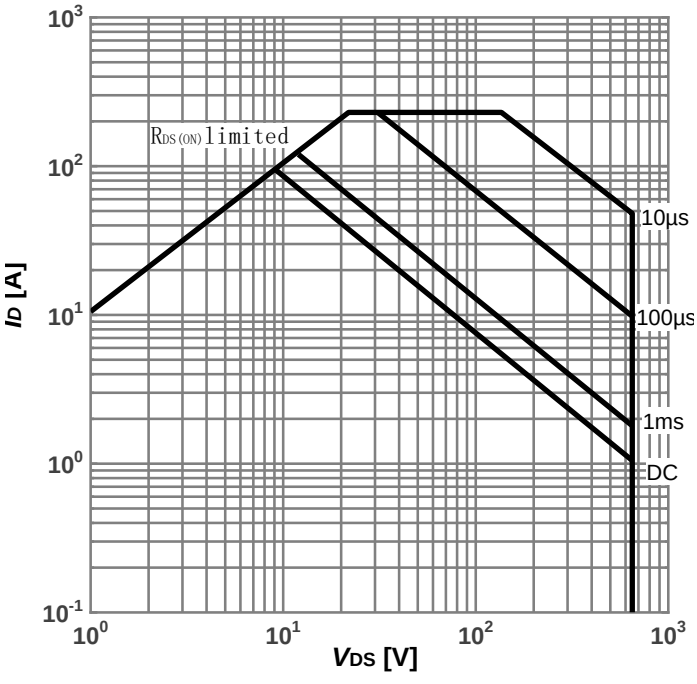
$P_{tot}=f(T_C)$

Diagram 2: Max. transient thermal impedance



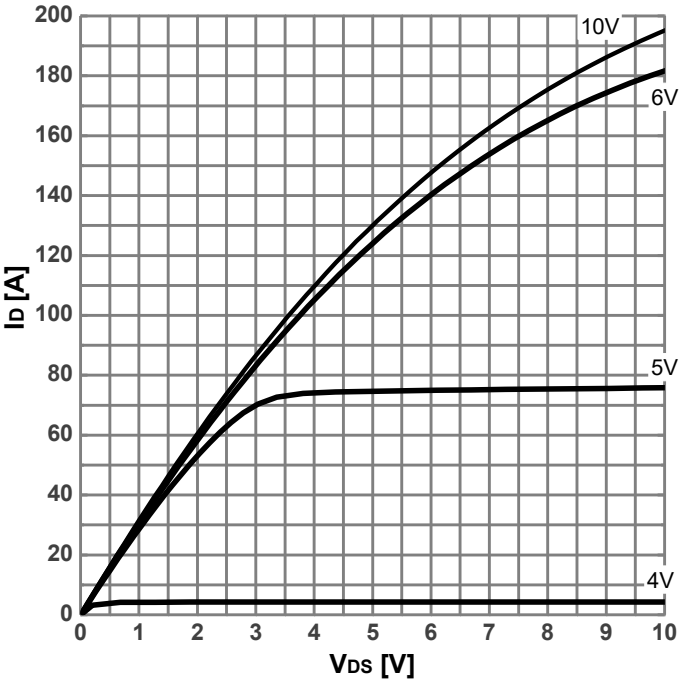
$Z_{thJC}=f(t_p)$; parameter: D= t_p/T

Diagram 3: Safe operating area



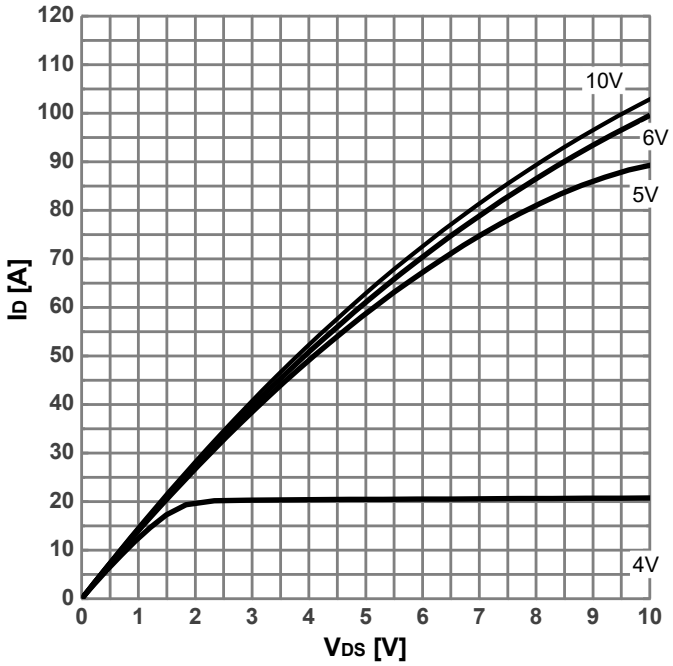
$I_D=f(V_{DS})$; T_j=25°C; D=0; parameter: t_p

Diagram 4: Typ. output characteristics



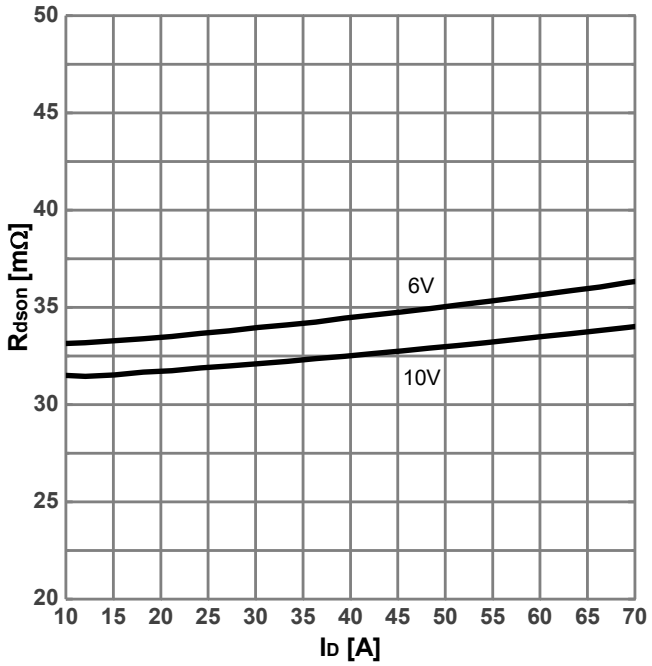
$I_D=f(V_{DS})$; T_j=25°C; parameter: V_{GS}

Diagram 5: Typ. output characteristics



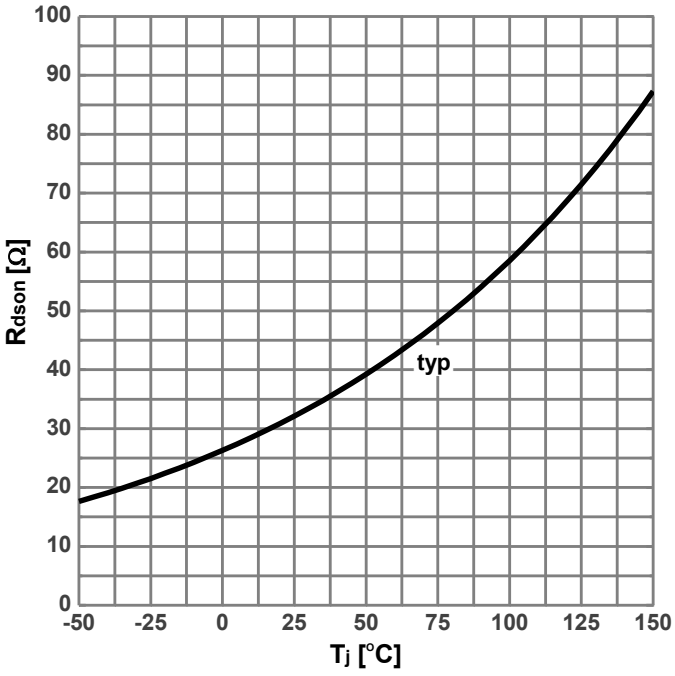
I_D=f(V_{DS}); Tj=125°C; parameter: V_{GS}

Diagram 6: Typ. drain-source on-state resistance



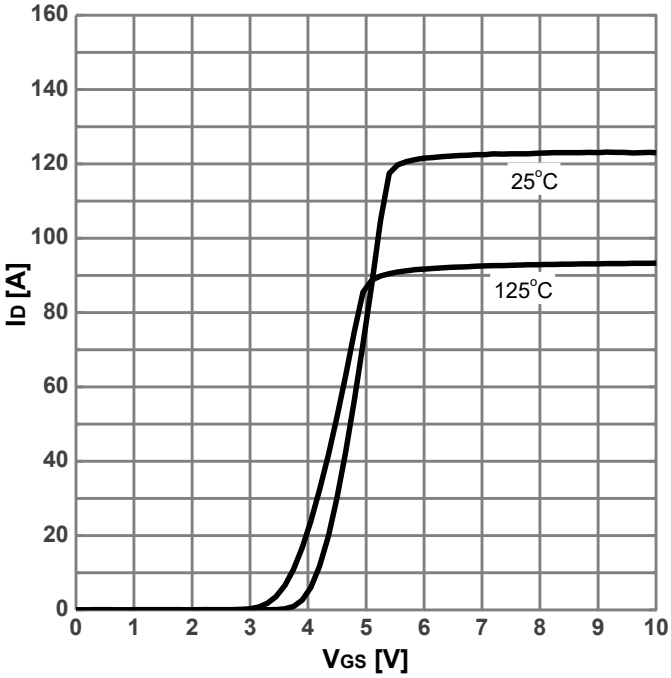
R_{DS}(on)=f(I_D); Tj=25°C; parameter: V_{GS}

Diagram 7: Drain-source on-state resistance



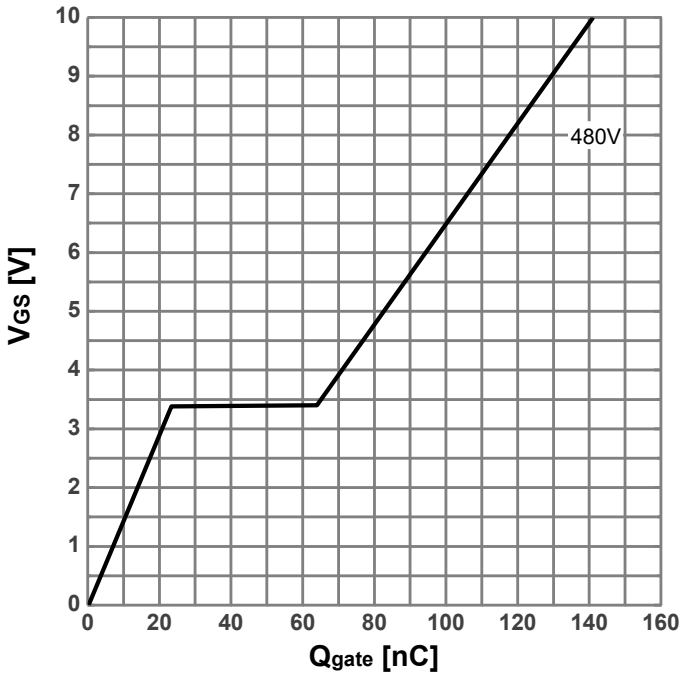
R_{DS}(on)=f(T_j); I_D=40A; V_{GS}=10V

Diagram 8: Typ. transfer characteristics



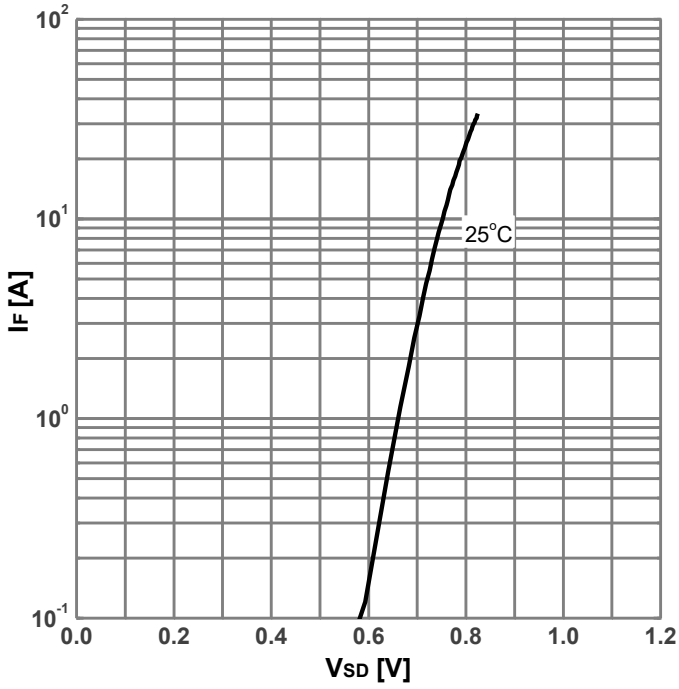
I_D=f(V_{GS}); V_{DS}=20V; parameter: T_j

Diagram 9: Typ. gate charge



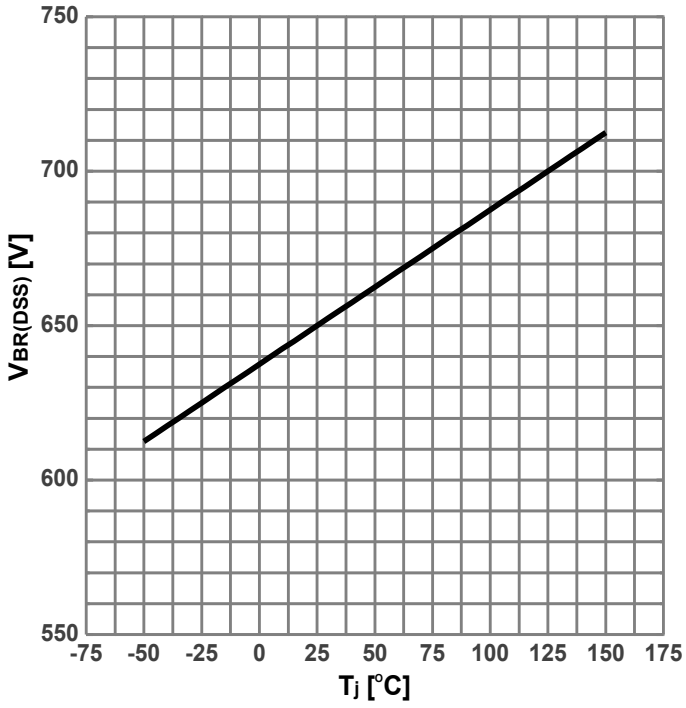
V_{GS}=f(Q_{gate}); I_D=40A pulsed; V_{DS}=400V

Diagram 10: Forward characteristics of reverse diode



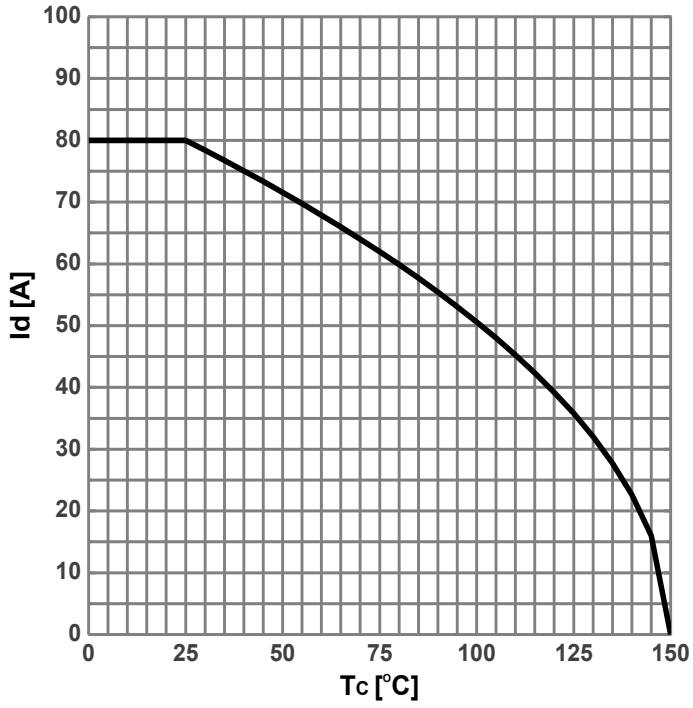
I_F=f(V_{SD}); parameter: T_j

Diagram 11: Drain-source breakdown voltage

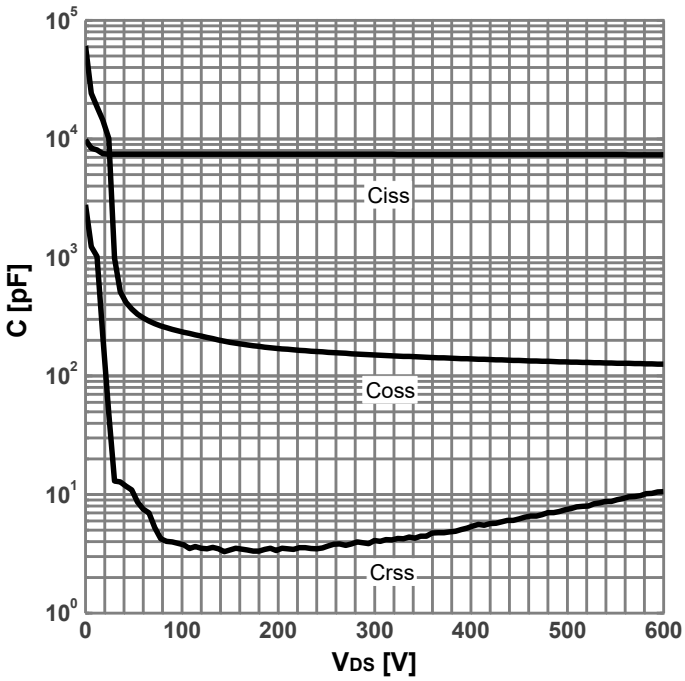
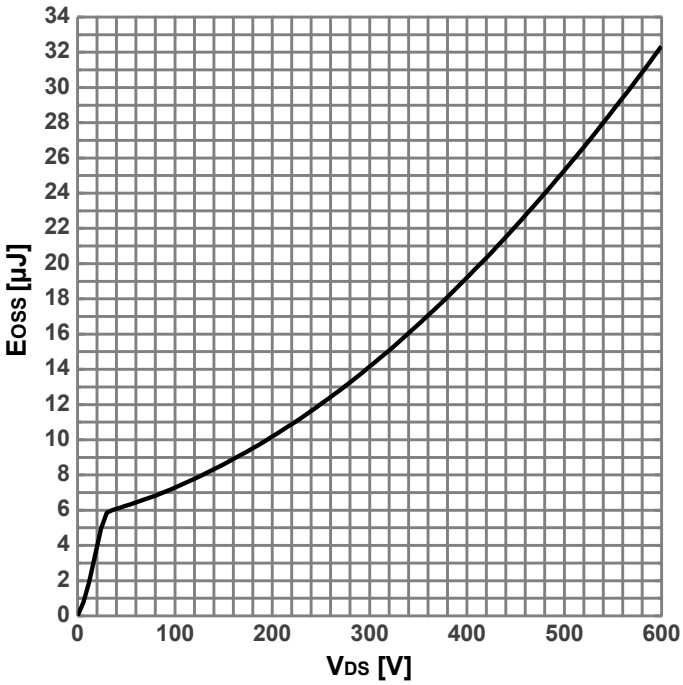


$V_{BR(DSS)}$=f(T_j); I_D=1mA

Diagram 12: Maximum Drain Current



I_D= f(T_c); V_{GS}=10V

Diagram 13: Typ. capacitances	Diagram 14: Typ. Coss stored energy
	
C=f(V_{DS}); V_{GS}=0V; f=100KHz	E_{OSS} =f(V_{DS})

6. Test Circuits

Table 7. Diode Characteristics

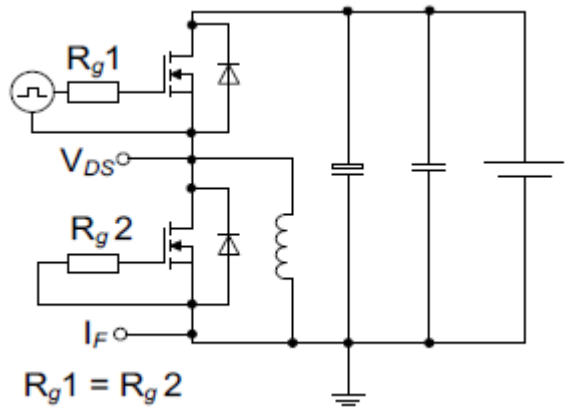
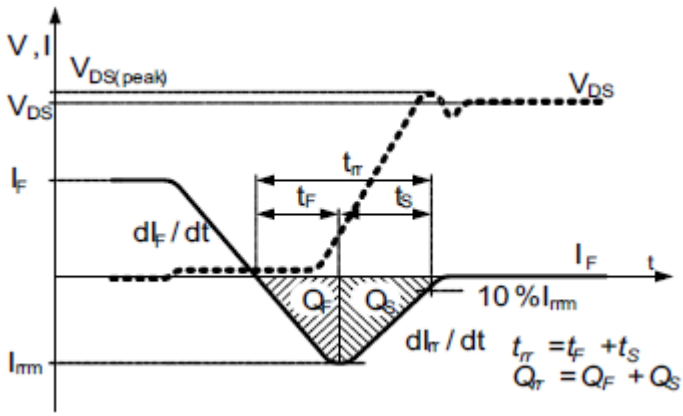
Test circuit for diode characteristics	Diode recovery waveform
	

Table 8. Switching Times

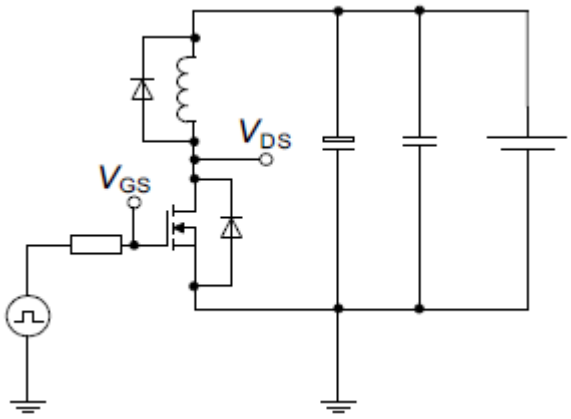
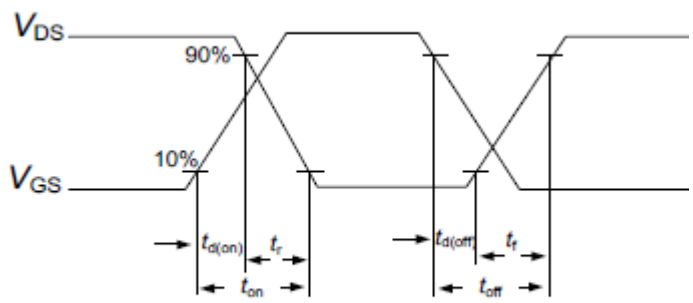
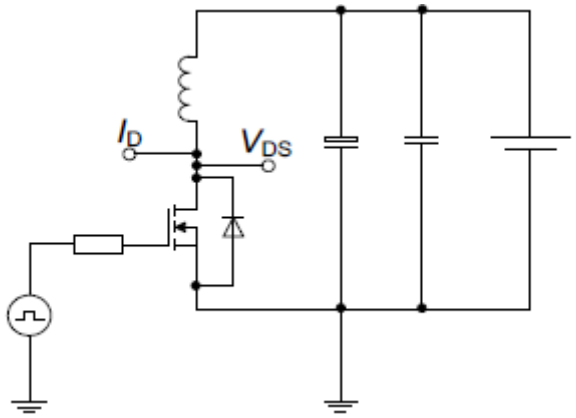
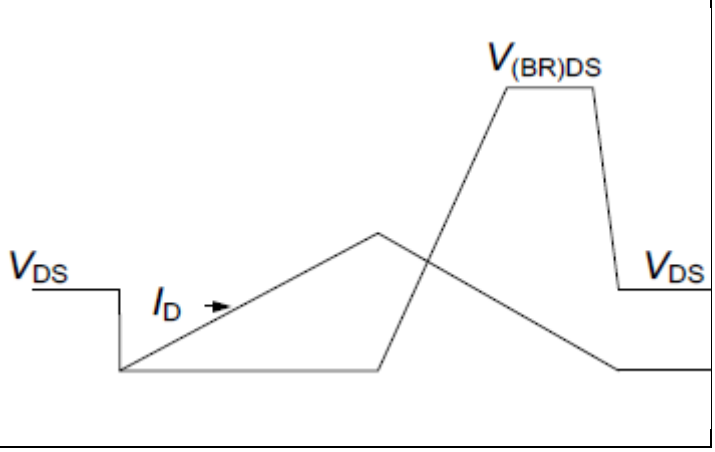
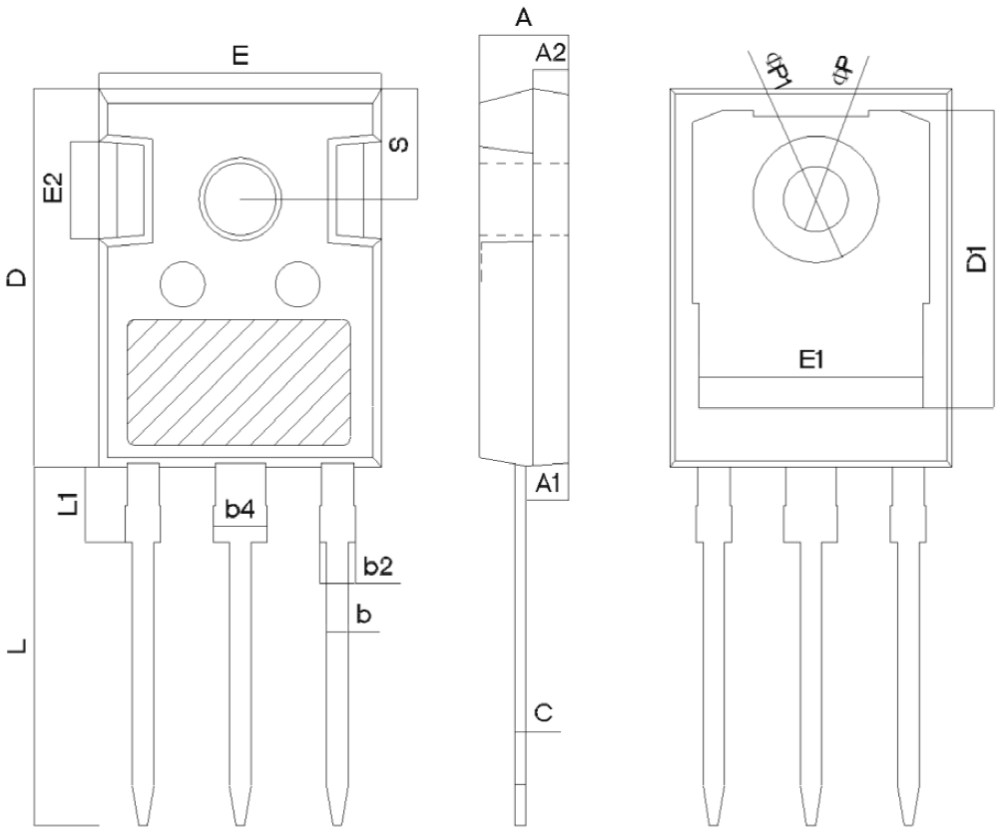
Switching times test circuit for inductive load	Switching times waveform
	

Table 9. Unclamped Inductive Load

Unclamped inductive load test circuit	Unclamped inductive waveform
	

7. Package Outlines

Figure 1 Outline TO-247 Dimensions in mm



SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		

8. Appendix

CoolSemi Webpage: www.coolsemi.com.

单击下面可查看定价，库存，交付和生命周期等信息

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