General description

Symbol	Value
V_{DSS} @ T_C=25℃	Min 650V
I_D @ T_C=25℃	40.8A
$R_{DS(on)}$	Typ 70mΩ
Q_G	Typ 80nC

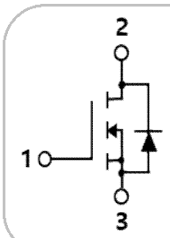
Package

TO-247

15.9x21.0x5.0mm

Features

- Low resistance
- Avalanche rated
- Low package inductance



1 : Gate
2 : Drain
3 : Source

Applications

- Power factor correction
- Server power supplies
- Telecom power supplies
- Inverters
- Motor control

Maximum Ratings (T_C = 25℃)

Parameter	Symbol	Test condition	Value	Unit
Drain - source voltage	V_{DSS}	T_C=25℃	650	V
Gate - source voltage	V_{GS}	-	±30	V
Continuous drain current	I_D	V_{GS}=20V , T_c=25℃	40.8	A
		V_{GS}=20V , T_c=100℃	25.8	A
Pulsed drain current	$I_{D(pulse)}$	Pulse width t_P limited by $T_{j,max}$	175	A
Avalanche energy, single pulse	E_{AS}	I_D=7.2A , V_{DD}=50V	650	mJ
Avalanche energy, repetitive	E_{AR}	I_D=7.2A , V_{DD}=50V	1.0	mJ
Avalanche current, repetitive	I_{AR}	-	8.7	A
Power dissipation	P_D	T_C=25℃	275	W
Operating and storage temperature range	T_j,T_{stg}	-	-55 to 150	℃

Electrical characteristics (T_j = 25℃)

Parameter	Symbol	Test condition	Value			Unit
			Min	Typ	Max	
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=1mA	650	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=650V, V_{GS}=0, T_j=25℃	-	-	10	uA
		V_{DS}=650V, V_{GS}=0, T_j=150℃	-		100	uA
Gate-source leakage current	I_{GSS}	V_{GS}=20V, V_{DS}=0V	-	-	200	nA
		V_{GS}=-20V, V_{DS}=0V	-	-	200	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=100uA	2.5	3.2	4.0	V
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=15.9A	-	70	80	mΩ
Gate input resistance	R_G	f=1MHz, open drain	-	1.0	-	Ω
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=100V, f =1MHz	-	4300	-	pF
Output capacitance	C_{oss}		-	100	-	
Reverse transfer capacitance	C_{rss}		-	17	-	
Gate-source charge	Q_{GS}	V_{DS}=480V, V_{GS}=0 to 10V, I_D=15.9A	-	17	-	nC
Gate-drain charge	Q_{GD}		-	28	-	
Total gate charge	Q_G		-	80	-	
Turn on delay time	$t_{d(on)}$	V_{DS}=480V, V_{GS}=10V, I_D=15.9A, R_G= 1Ω	-	20	-	ns
Rise time	t_r		-	25	-	
Turn off delay time	$t_{d(off)}$		-	95	-	
Fall time	t_f		-	25	-	

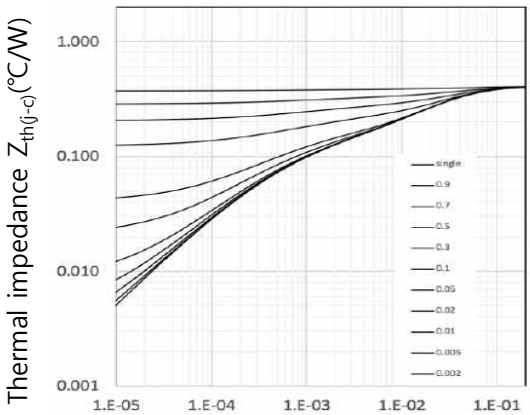
Body diode(source – drain) electrical characteristics (T_C = 25℃)

Parameter	Symbol	Test condition	Value			Unit
			Min	Typ	Max	
Forward voltage	V_{SD}	V_{GS}=0V, I_{SD}=31.8A	-	0.95	-	V
Continuous diode forward current	I_S	V_{GS}=0V, T_C=25℃	-	43.6	-	A
Reverse recovery time	t_{rr}	V_{GS}=0V, I_S=31.8A, di/dt=100A/μs, V_{DD}=60V	-	470	-	ns
Reverse recovery charge	Q_{rr}		-	10	-	nC
Peak reverse recovery current	I_{rrm}		-	50	-	A

Thermal characteristics (T_C = 25℃)

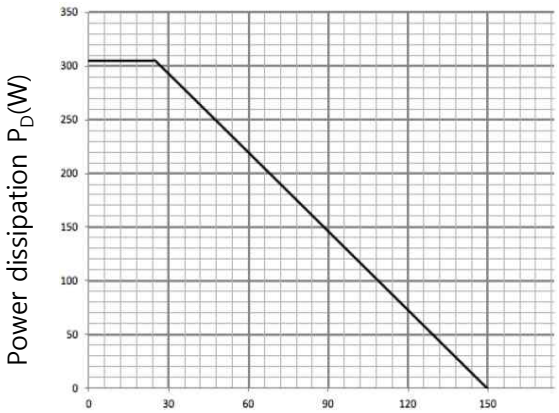
Symbol	Parameter	Typ	Max	Unit
$R_{th(j-c)}$	Junction to case	0.42	0.45	℃/W

t_p – $Z_{th(j-c)}$ Characteristics



Time t(s)

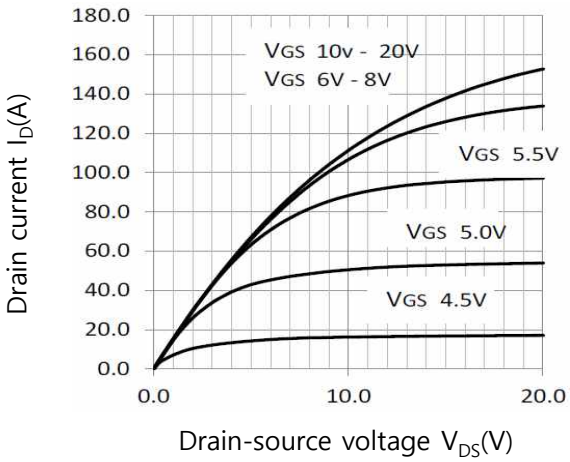
T_C – P_D Characteristics



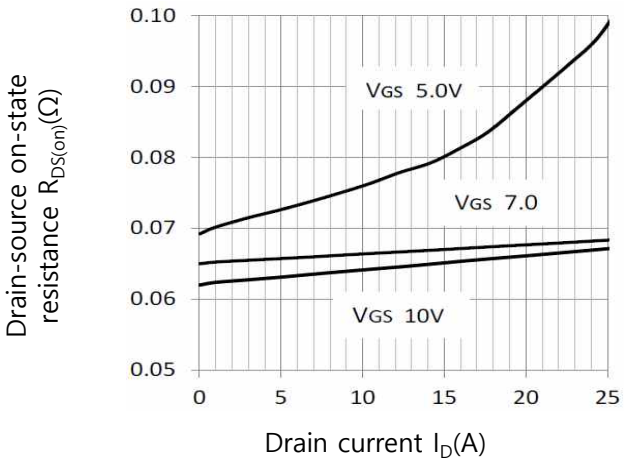
Case temperature T_C(℃)

Typical electrical characteristics curves (T_C = 25℃)

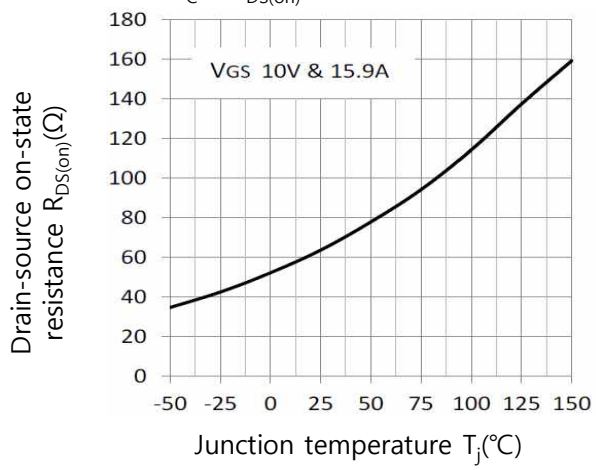
V_{DS} – I_D Characteristics, T_j=25℃



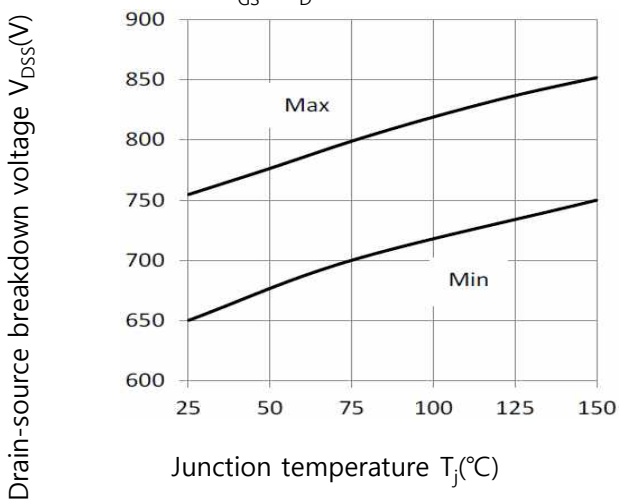
I_D – $R_{DS(on)}$ Characteristics



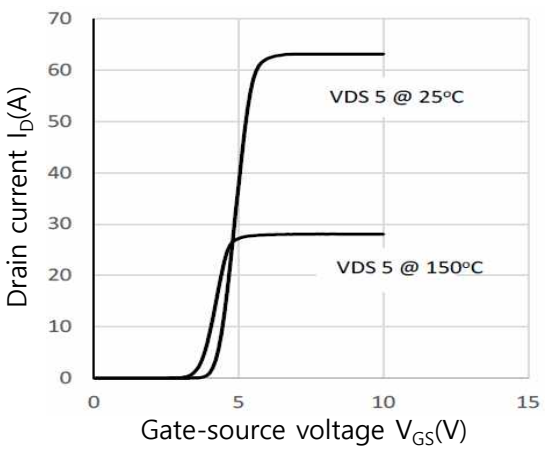
T_C – $R_{DS(on)}$ Characteristics



V_{GS} – I_D Characteristics

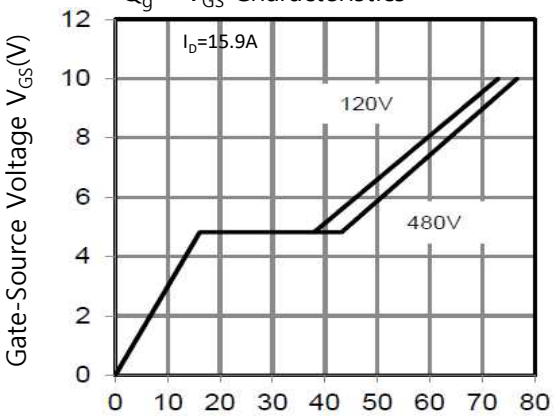


V_{GS} – I_D Characteristics



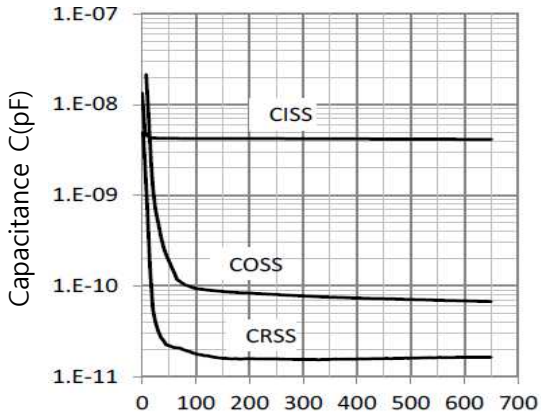
Typical electrical characteristics curves (T_C = 25℃)

Q_g – V_{GS} Characteristics



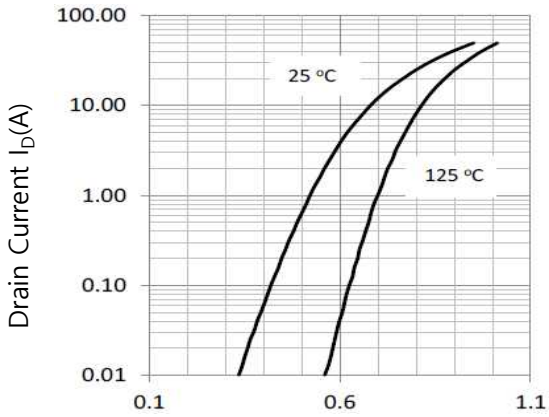
Total gate charge Q_g(nC)

V_{DS} – C Characteristics



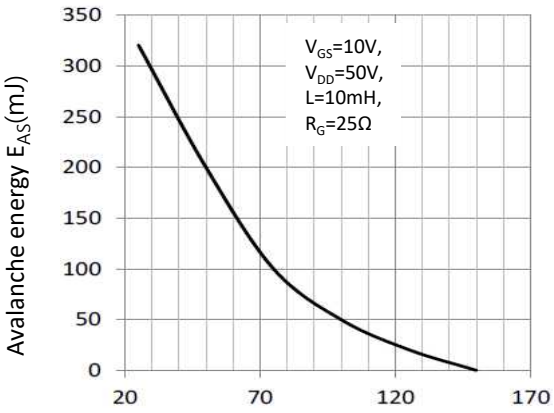
Drain-source voltage V_{DS}(V)

V_{SD} – I_D Characteristics



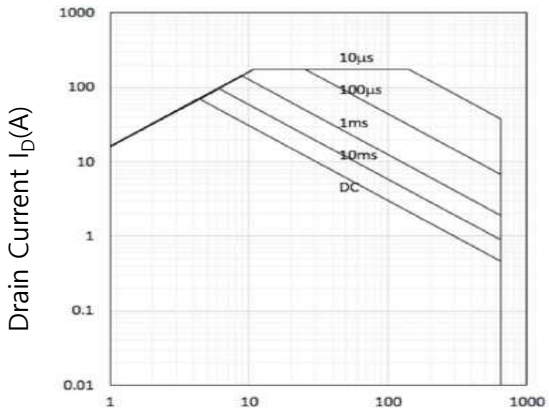
Source-drain forward voltage V_{SD}(V)

T_j – E_{AS} Characteristics



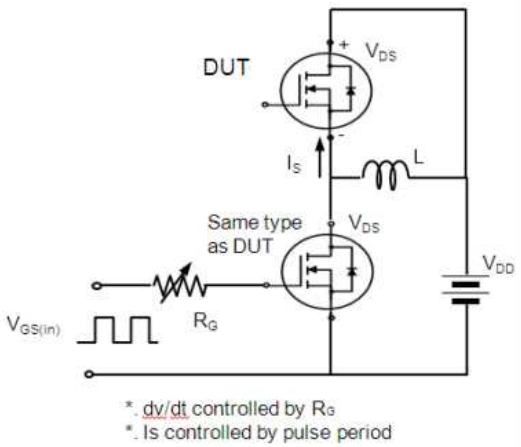
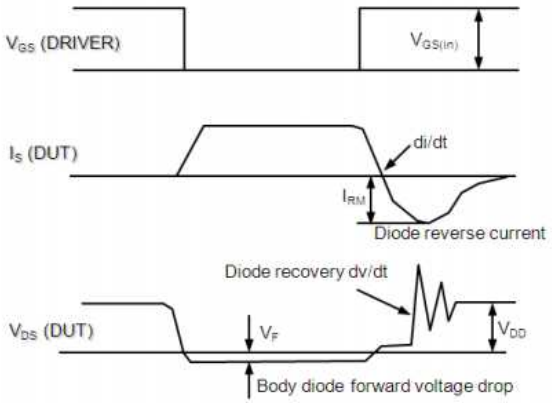
T_j(℃)

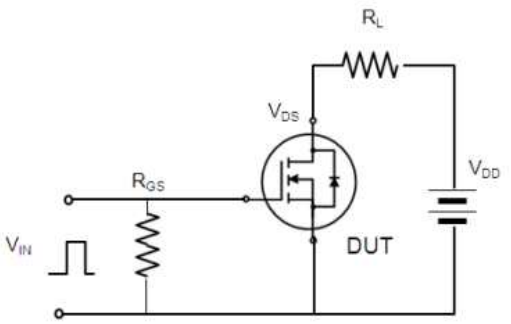
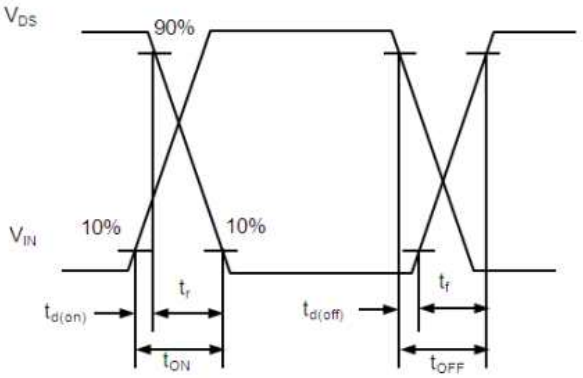
Safe operating area, T_C=25℃



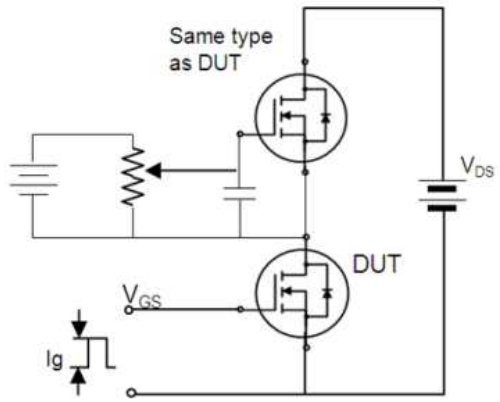
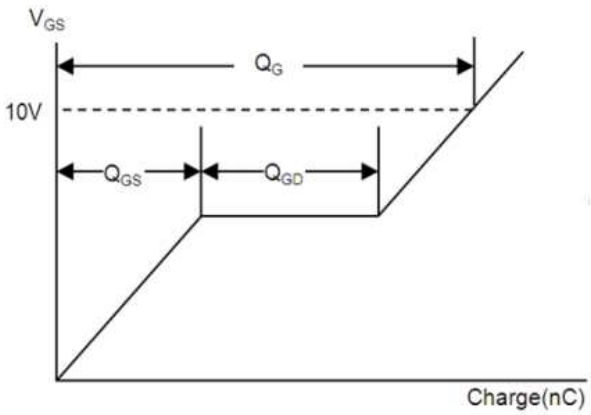
Drain-source voltage V_{DS}(V)

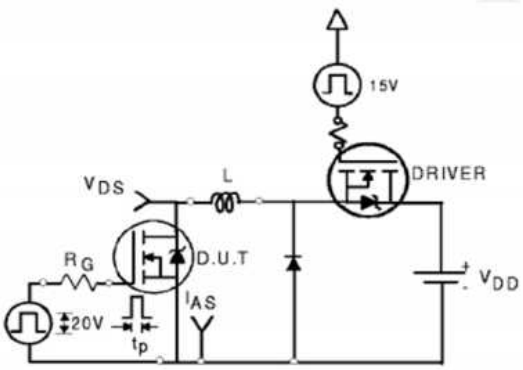
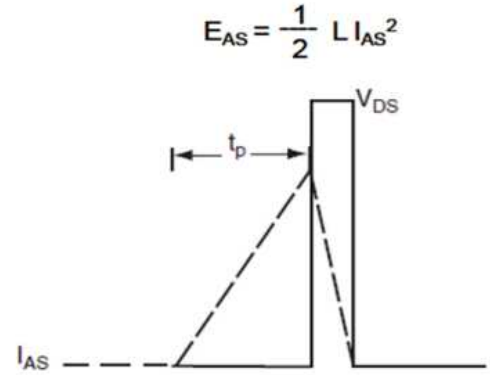
Typical device performance

Test Ciruit For Diode Recovery	Test Waveform For Diode Recovery
	

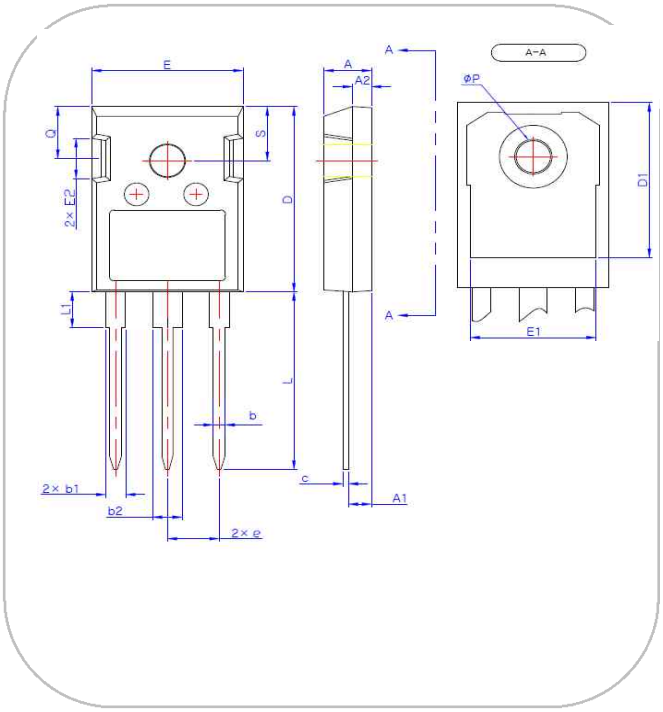
Test Ciruit for Switching Time	Test Waveform for Switching Time
	

Typical device performance

Test Ciruit For Gate Charge	Test Waveform For Gate Charge
	

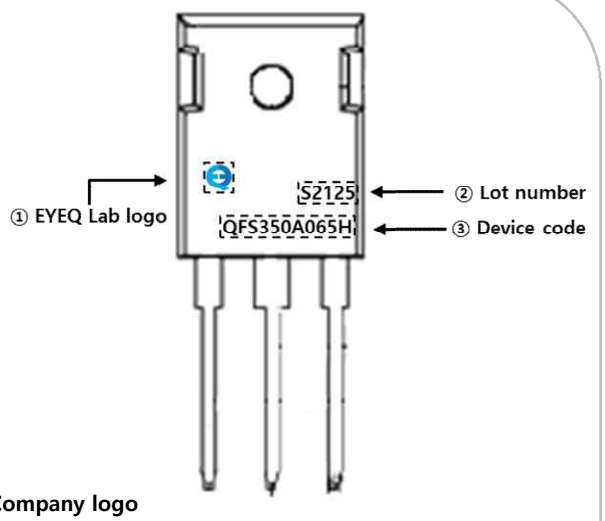
Test Ciruit For Unclamped Inductive	Test Waveform For Unclamped Inductive
	

Package dimensions (TO-247)



Symbol	Min	Nom	Max
A	4.80	5.00	5.20
A1	2.29	2.36	2.54
A2	1.90	2.00	2.10
b	1.10	1.20	1.30
b1	1.91	2.11	2.20
b2	2.92	3.10	3.20
c	0.50	0.60	0.70
D	20.80	21.07	21.34
D1	17.43	17.63	17.83
E	15.75	15.94	16.13
E1	13.06	13.26	13.46
E2	4.32	4.58	4.83
e		5.45 BSC	
L	19.85	20.00	20.25
L1	-	-	4.49
ΦP	3.55	3.60	3.65
Q	5.59	5.89	6.19
S		6.15 BSC	

Marking Information



① Company logo
② Lot number : S – Assembly 21 – 2021 Year , 25 – W25
③ Device code : Q – EYEQ Lab, G – IGBT, S – Si,
15 – 15A, A – Device generation 1
120 – 1200V, H – TO-247