General description

Symbol	Value
V_{DSS} @ T_C=25℃	Min 650V
I_D @ T_C=25℃	32A
$R_{DS(on)}$	Typ 100mΩ
Q_G	Typ 70nC

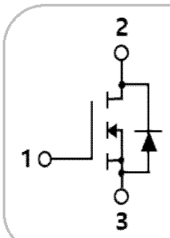
Package

TO-247

15.9x21.0x5.0mm

Features

- High blocking voltage with low on-resistance
- 175℃ maximum operating temperature
- Fast switching speed
- Fast reverse recovery



1 : Gate
2 : Drain
3 : Source

Applications

- DC/DC converters
- High voltage quick charger (EV)
- Solar inverters
- UPS
- Induction heating
- Motor drives

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}	-	-5 / +20	V
Continuous drain current	I_D	V_{GS}=20V , T_c=25℃	32	A
		V_{GS}=20V , T_c=110℃	22	A
Pulsed drain current	$I_{D(pulse)}$	Pulse width t_P limited by $T_{j,max}$	58.5	A
Power dissipation	P_D	T_C=25℃	165	W
Operating and storage temperature range	T_j,T_{stg}	-	-55 to 175	℃

Electrical characteristics (T_C = 25℃)

Parameter	Symbol	Test condition	Value			Unit
			Min	Typ	Max	
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=100μA	650	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=650V, V_{GS}=0, T_C=25℃	-	1	200	uA
		V_{DS}=650V, V_{GS}=0, T_C=175℃	-	20	-	uA
Gate-source leakage current	I_{GSS}	V_{GS}=20V, V_{DS}=0V	-	-	200	nA
		V_{GS}=-5V, V_{DS}=0V	-	-	200	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=10V, I_D=10mA	-	2.6	-	V
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=20V, I_D=12A	-	100	130	mΩ
Gate input resistance	R_G	f = 1MHz, open drain	-	2	-	Ω
Trans conductance	g_{fs}	V_{DS}=15V, I_D=25A	-	8.5	-	S
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=400V, f =1MHz	-	920	-	pF
Output capacitance	C_{oss}		-	110	-	
Reverse transfer capacitance	C_{rss}		-	15	-	
Effective output capacitance, energy related	$C_{o(er)}$	V_{GS}=0V, V_{DS}=0 to 400V	-	140	-	pF
Gate-source charge	Q_{GS}	V_{DS}=400V, V_{GS}=-5/+20V, I_D=12A	-	14	-	nC
Gate-drain charge	Q_{GD}		-	35	-	
Total gate charge	Q_G		-	70	-	
Turn on delay time	$t_{d(on)}$	V_{DS}=400V, V_{GS}=-4/+20V, I_D=10A, R_L=40Ω, $R_{G(ext)}$= 2.7Ω	-	15	-	ns
Rise time	t_r		-	17	-	
Turn off delay time	$t_{d(off)}$		-	17	-	
Fall time	t_f		-	20	-	
Turn-on switching energy	E_{on}	V_{DS}=400V, V_{GS}=0/20V, I_D=12A, $R_{G(ext)}$= 2.7Ω	-	7*	-	uJ
Turn-off switching energy	E_{off}		-	10*	-	

* Based on the results of calculation, note that the energy loss caused by the reverse recovery of free-wheeling diode is not included in Eon

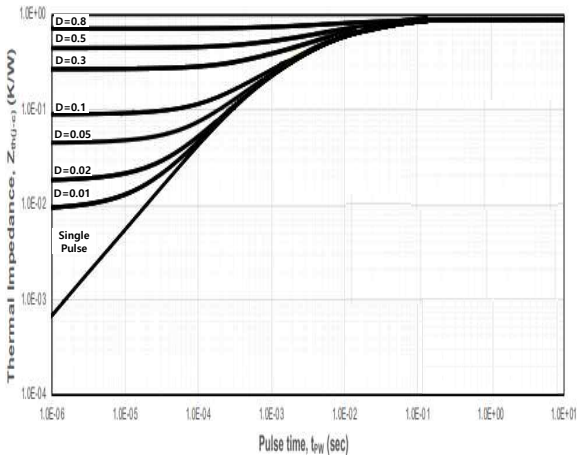
Body diode(source – drain) electrical characteristics (T_C = 25℃)

Parameter	Symbol	Test condition	Value			Unit
			Min	Typ	Max	
Forward voltage	V_{SD}	V_{GS}=0V, I_{SD}=3A	-	3.3	-	V
Continuous diode Forward current	I_S	V_{GS}=-5V, T_C=25℃	-	26	-	A
Reverse recovery time	T_{rr}	V_{GS}=0V, I_S=12A, V_{DS}=400V, di/dt=300A/μs	-	60	-	ns
Reverse recovery charge	Q_{rr}		-	125	-	nC
Peak reverse Recovery current	I_{rrm}		-	2.6	-	A

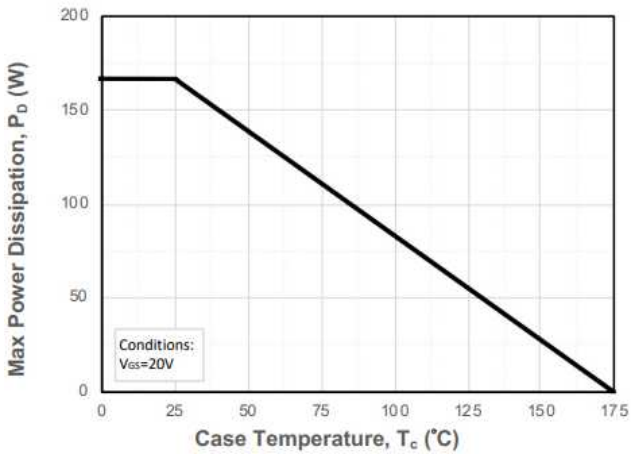
Thermal characteristics (T_C = 25℃)

Symbol	Parameter	Typ	Max	Unit
$R_{th(j-c)}$	Junction to case	0.9	-	℃/W

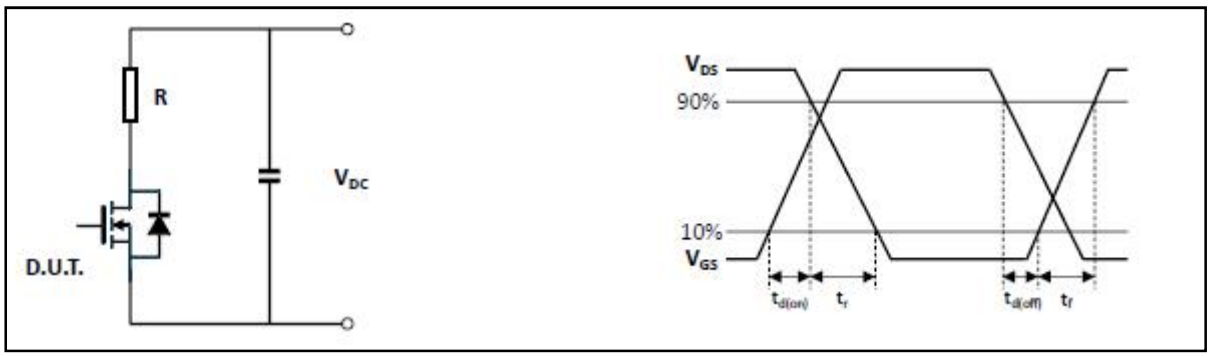
t_p – Z_{thjc} Characteristics



T_C – P_{tot} Characteristics

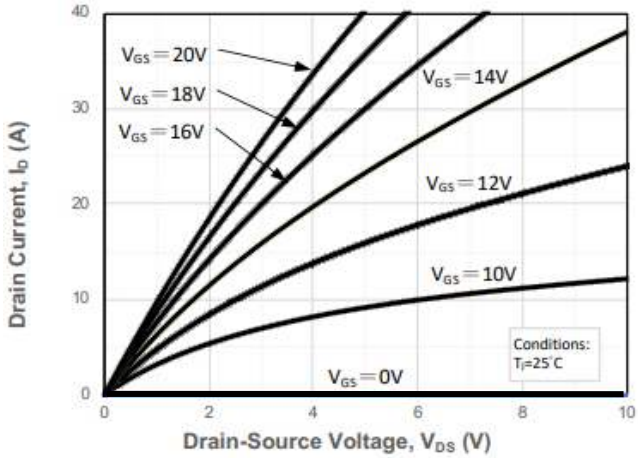


Typical device performance

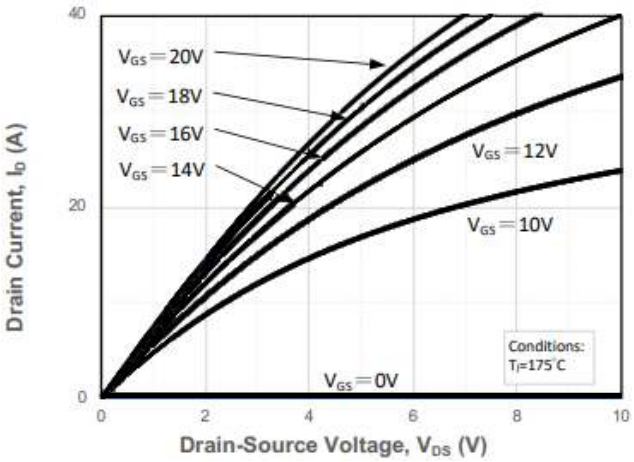


Typical electrical characteristics curves (T_C = 25℃)

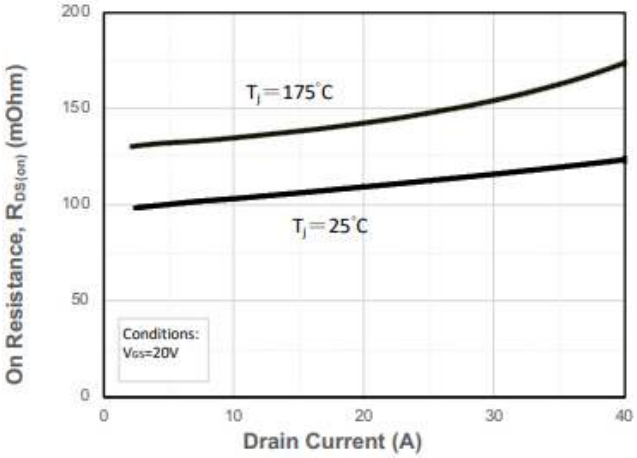
V_{DS} – I_D Characteristics, T_j=25℃



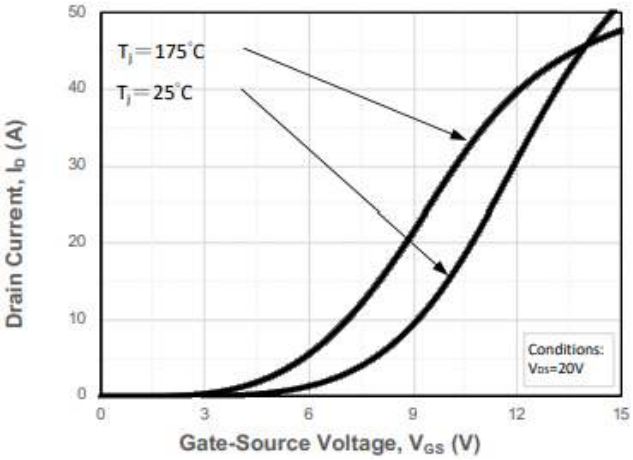
V_{DS} – I_D Characteristics, T_j=175℃



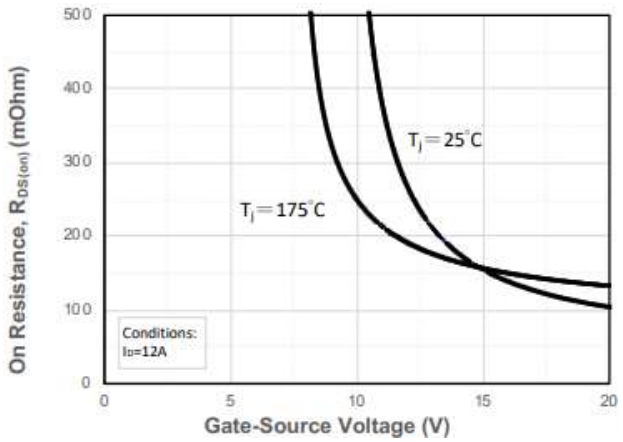
I_D – $R_{DS(on)}$ Characteristics



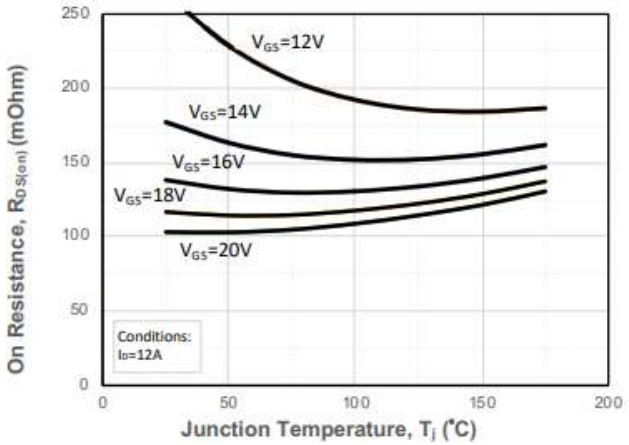
V_{GS} – I_D Characteristics



V_{GS} – $R_{DS(on)}$ Characteristics

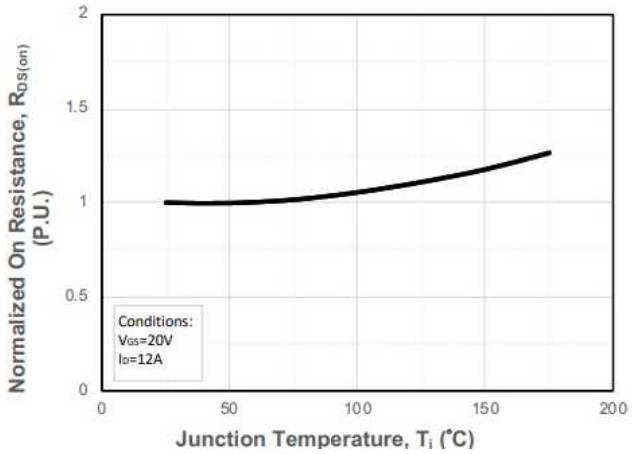


T_j – $R_{DS(on)}$ Characteristics

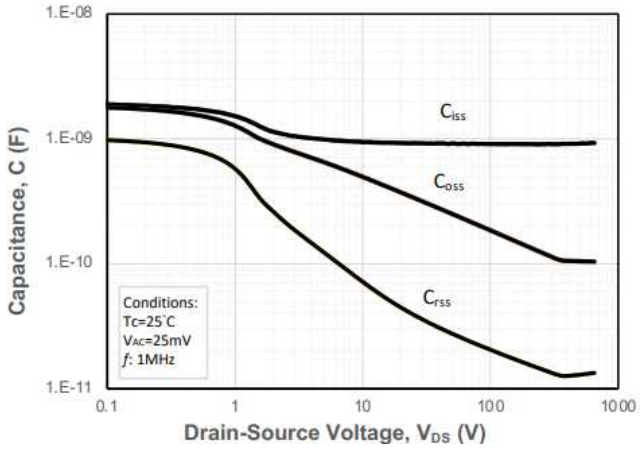


Typical electrical characteristics curves (T_C = 25℃)

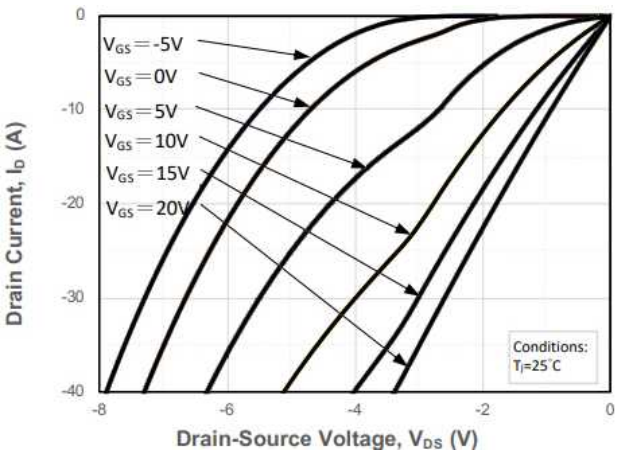
T_j – $R_{DS(on)}$ Characteristics



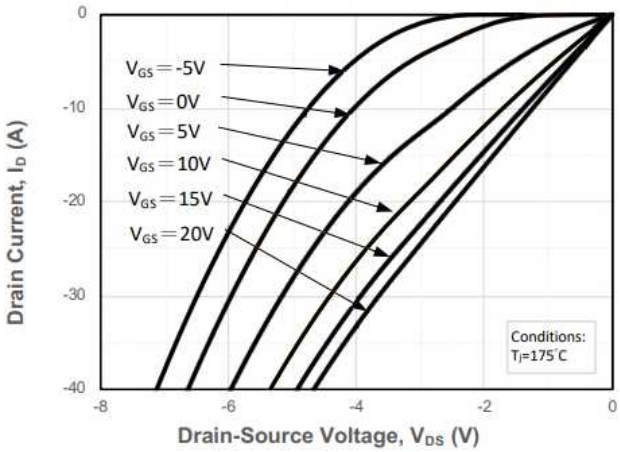
V_{DS} – C Characteristics



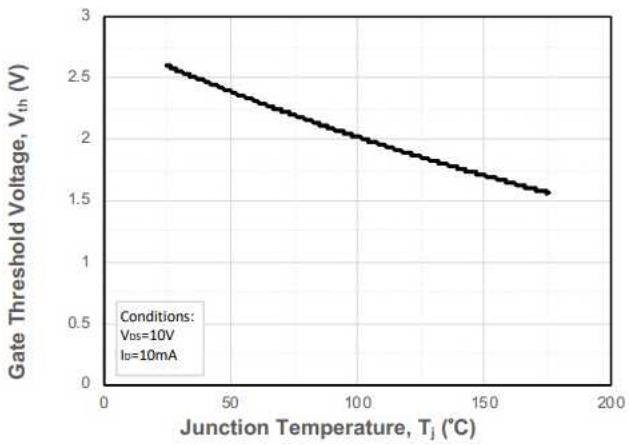
V_{DS} – I_D Characteristics, T_j=25℃



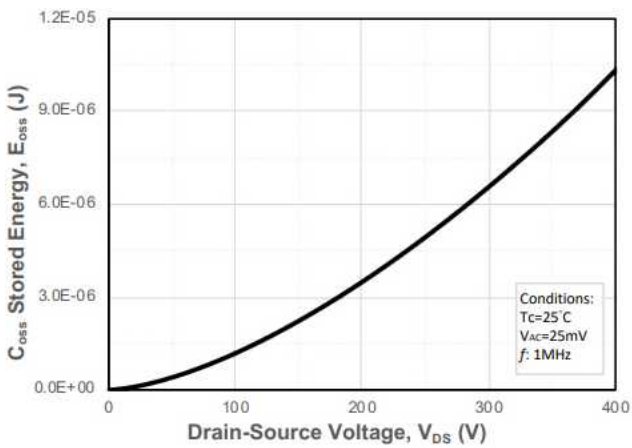
V_{DS} – I_D Characteristics, T_j=175℃



T_j – V_{th} Characteristics

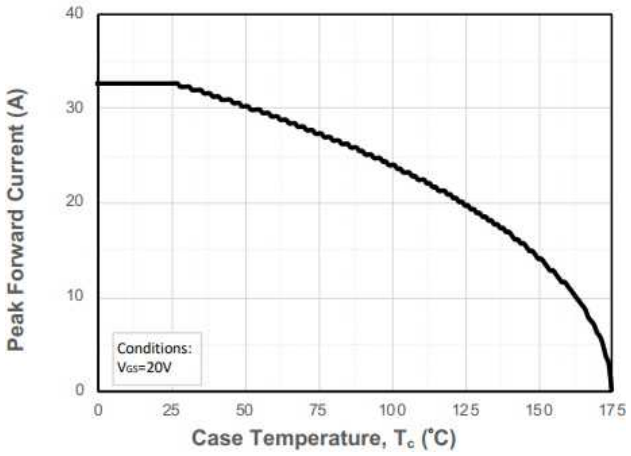


V_{DS} – E_{oss} Characteristics

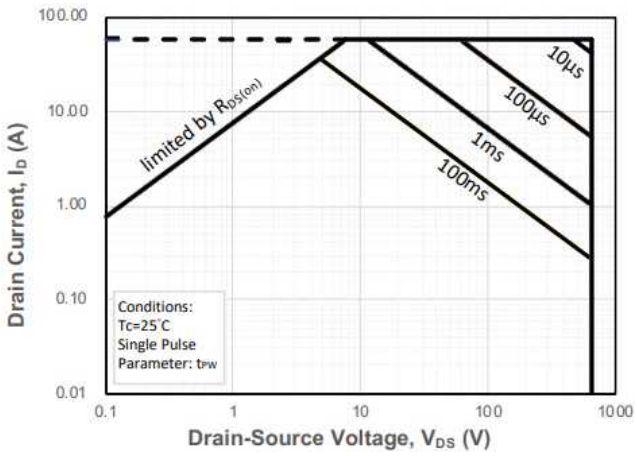


Typical electrical characteristics curves (T_C = 25℃)

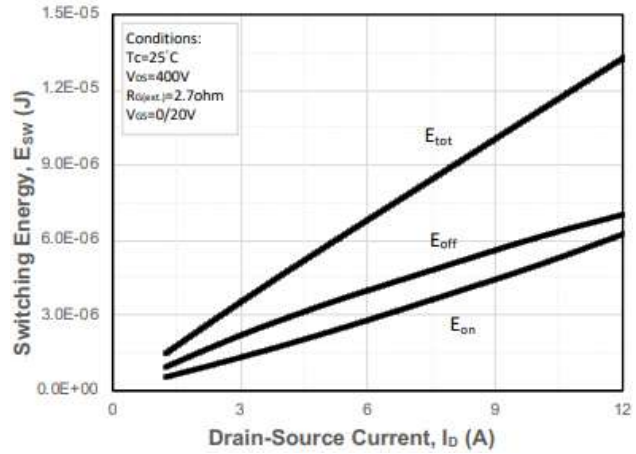
T_C – I_S Characteristics



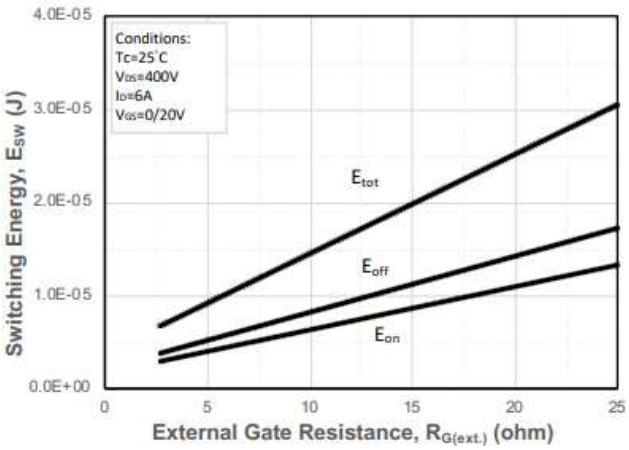
Safe Operating Area (SOA)



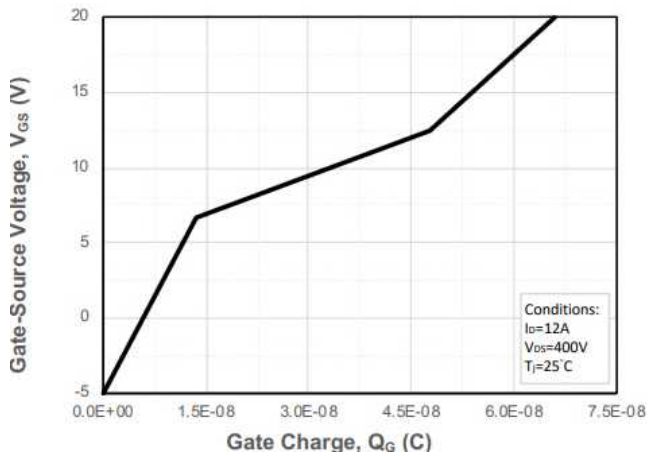
I_D – E_{SW} Characteristics



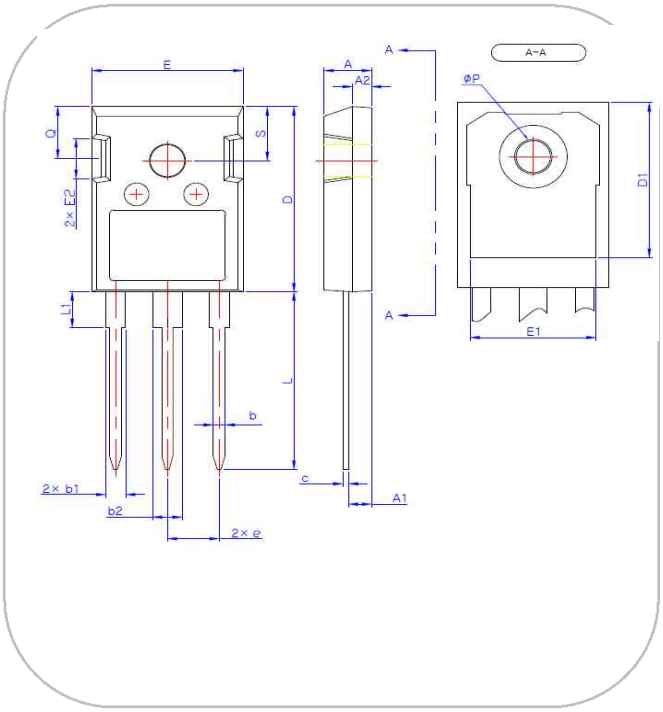
$R_{G(ext)}$ – E_{SW} Characteristics



Q_G – V_{GS} Characteristics

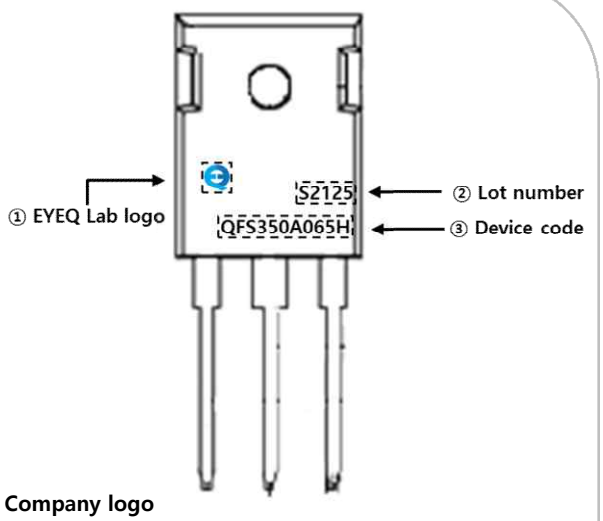


Package dimensions (TO-247)



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 – Year 2021, 25 – W25

③ Device code : Q – EYEQ Lab, F – MOSFET, C – SiC,
20 – 20mΩ, A – Device generation 1
065 – 650V, H – TO-247