

 **General description**

Symbol	Value
V_{DSS} @ $T_C=25^\circ\text{C}$	Min 650V
I_D @ $T_C=25^\circ\text{C}$	58A
$R_{DS(on)}$	Typ 50mΩ
Q_G	Typ 125nC

 **Features**

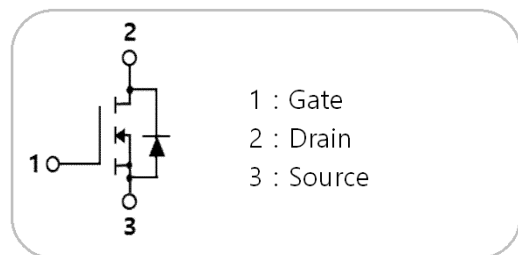
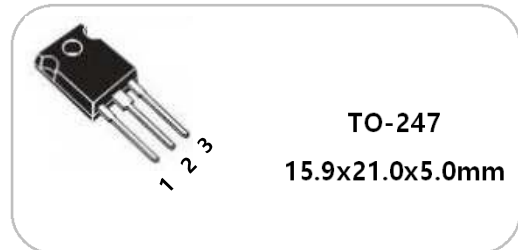
- High blocking voltage with low on-resistance
- 175°C maximum operating temperature
- Fast switching speed
- Fast reverse recovery

 **Applications**

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

 **Maximum ratings ($T_C = 25^\circ\text{C}$)**

Parameter	Symbol	Test condition	Value	Unit
Drain - source voltage	V_{DSS}	$T_C=25^\circ\text{C}$	650	V
Gate - source voltage	V_{GS}	-	-5 / +20	V
Continuous drain current	I_D	$V_{GS}=20\text{V}$, $T_C=25^\circ\text{C}$	58	A
		$V_{GS}=20\text{V}$, $T_C=110^\circ\text{C}$	40	A
Pulsed drain current	$I_{D(pulse)}$	Pulse width t_p limited by $T_{j,max}$	120	A
Power dissipation	P_D	$T_C=25^\circ\text{C}$	230	W
Operating and storage temperature range	$T_{j, Tstg}$	-	-55 to 175	$^\circ\text{C}$

 **Package**



Electrical characteristics ($T_C = 25^\circ\text{C}$)

Parameter	Symbol	Test condition	Value			Unit
			Min	Typ	Max	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=100\mu A$	650	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=650V, V_{GS}=0, T_C=25^\circ\text{C}$	-	1	200	μA
		$V_{DS}=650V, V_{GS}=0, T_C=175^\circ\text{C}$	-	20	-	μA
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	$V_{GS(th)}$	$V_{DS}=10V, I_D=20mA$	-	2.6	-	V
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=20V, I_D=20A$	-	50	65	mΩ
Gate input resistance	R_G	$f = 1\text{MHz}$, open drain	-	1.2	-	Ω
Trans conductance	g_{fs}	$V_{DS}=15V, I_D=40A$	-	13.5	-	S
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=400V, f=1\text{MHz}$	-	1900	-	pF
Output capacitance	C_{oss}		-	210	-	
Reverse transfer capacitance	C_{rss}		-	35	-	
Effective output capacitance, energy related	$C_{o(er)}$	$V_{GS}=0V, V_{DS}=0 \text{ to } 400V$	-	240	-	pF
Gate-source charge	Q_{GS}	$V_{DS}=400V, V_{GS}=-5/+20V, I_D=30A$	-	32	-	nC
Gate-drain charge	Q_{GD}		-	45	-	
Total gate charge	Q_G		-	125	-	
Turn on delay time	$t_{d(on)}$	$V_{DS}=400V, V_{GS}=-4/+20V, I_D=20A, R_t=20\Omega, R_{G(ext)}=2.7\Omega$	-	18	-	ns
Rise time	t_r		-	20	-	
Turn off delay time	$t_{d(off)}$		-	25	-	
Fall time	t_f		-	15	-	
Turn-on switching energy	E_{on}	$V_{DS}=400V, V_{GS}=0/20V, I_D=20A, R_{G(ext)}=2.7\Omega$	-	25*	-	μJ
Turn-off switching energy	E_{off}		-	30*	-	

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



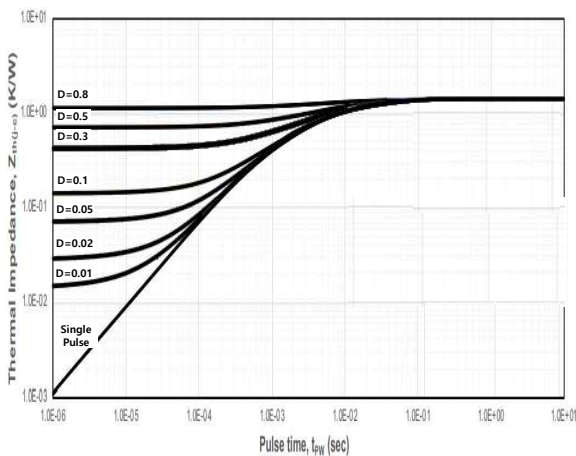
Body diode(source – drain) electrical characteristics (T_C = 25°C)

Parameter	Symbol	Test Condition	Value			Unit
			Min	Typ	Max	
Forward voltage	V _{SD}	V _{GS} =0V, I _{SD} =5A	-	3.0	-	V
Continuous Diode Forward Current	I _S	V _{GS} =-5V, T _C =25°C	-	36	-	A
Reverse Recovery Time	T _{rr}	V _{GS} =0V, I _S =30A, V _{DS} =400V, di/dt=300A/μs	-	60	-	ns
Reverse Recovery Charge	Q _{rr}		-	125	-	nC
Peak Reverse Recovery Current	I _{rrm}		-	3.8	-	A

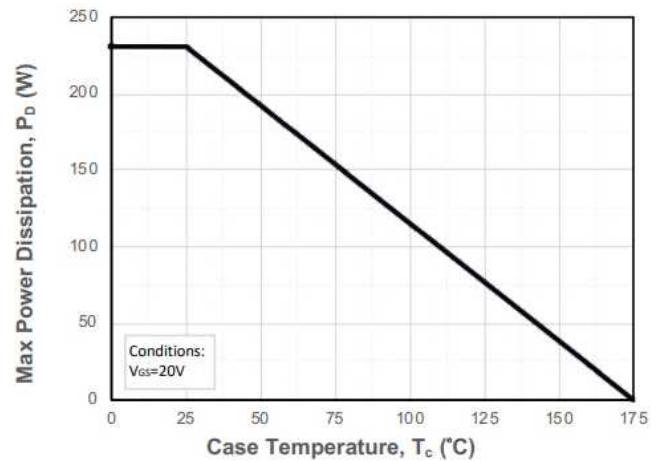
Thermal characteristics (T_C = 25°C)

Symbol	Parameter	Typ	Max	Unit
R _{th(j-c)}	Junction to case	0.65	-	°C/W

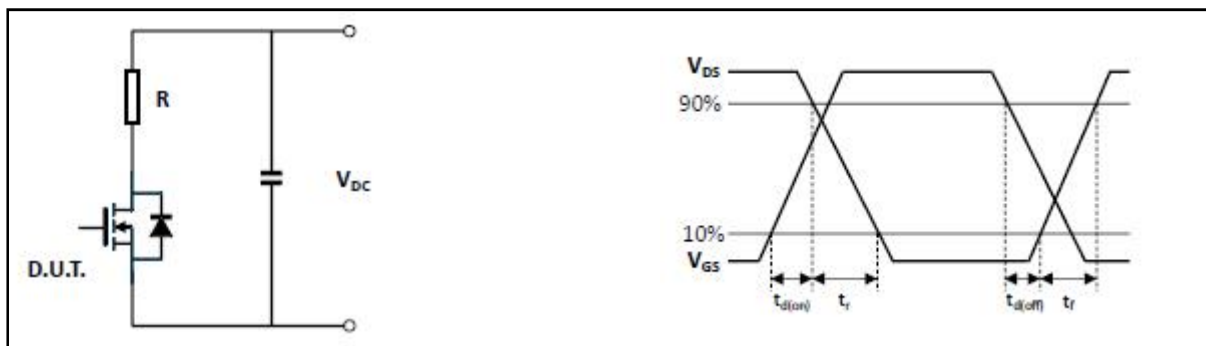
t_p – Z_{thjc} Characteristics



T_C – P_{tot} Characteristics

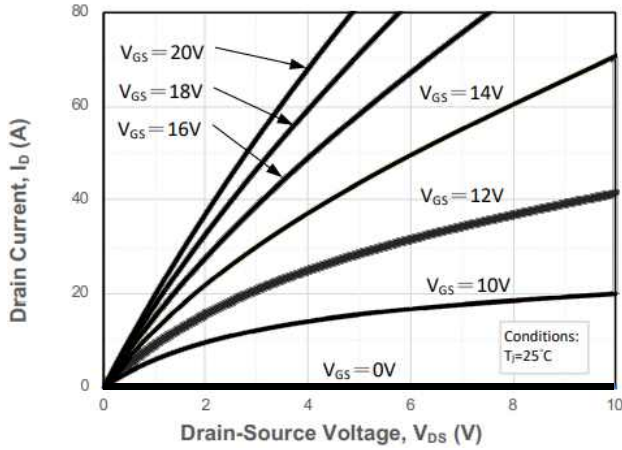


Typical device performance

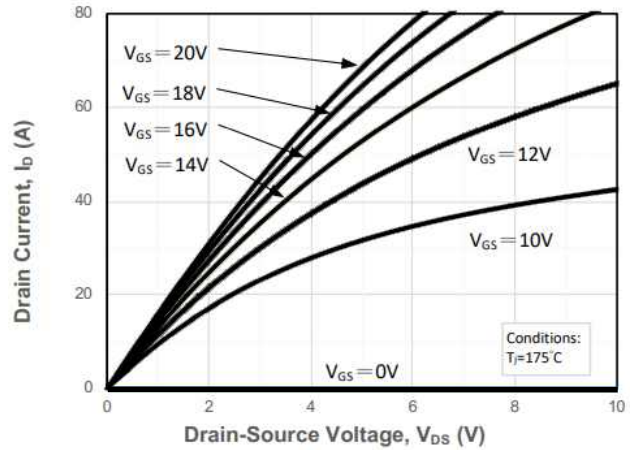


Typical electrical characteristics curves (T_C = 25°C)

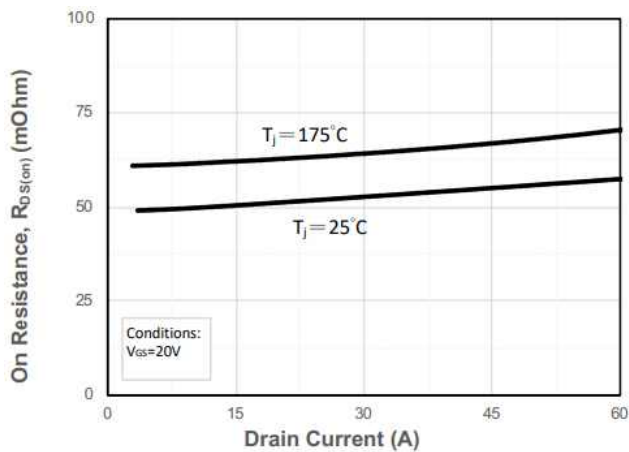
V_{DS} – I_D Characteristics, T_J=25°C



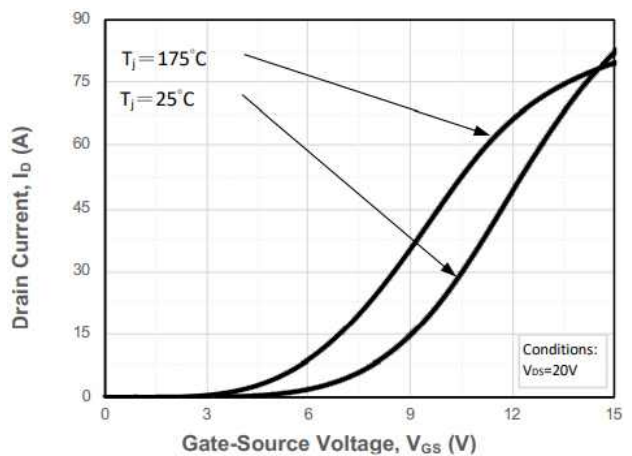
V_{DS} – I_D Characteristics, T_J=175°C



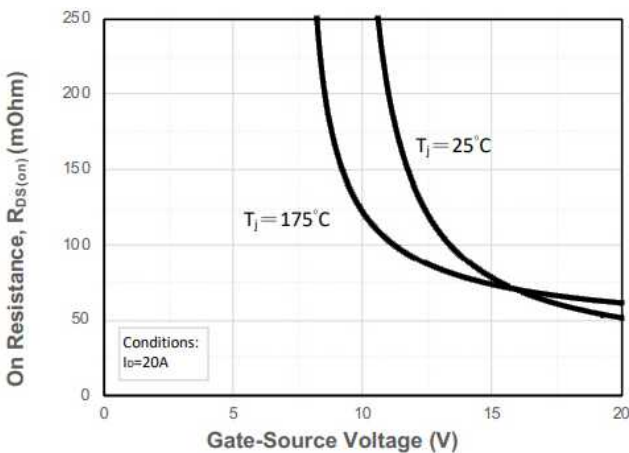
I_D – R_{DS(on)} Characteristics



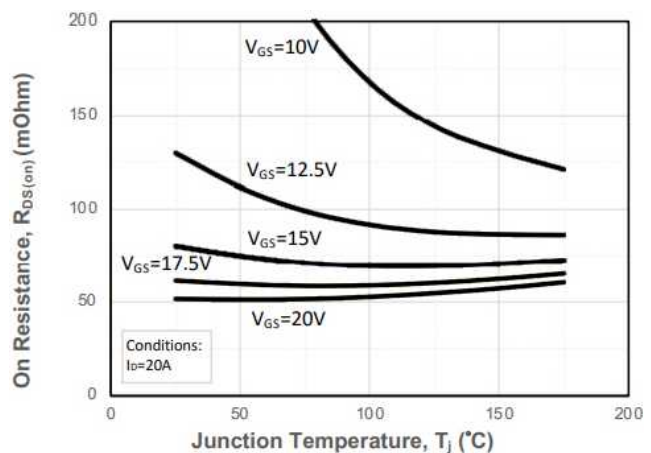
V_{GS} – I_D Characteristics



V_{GS} – R_{DS(on)} Characteristics

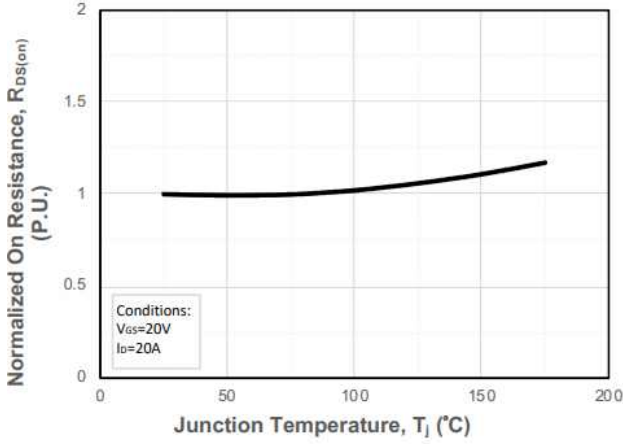


T_J – R_{DS(on)} Characteristics

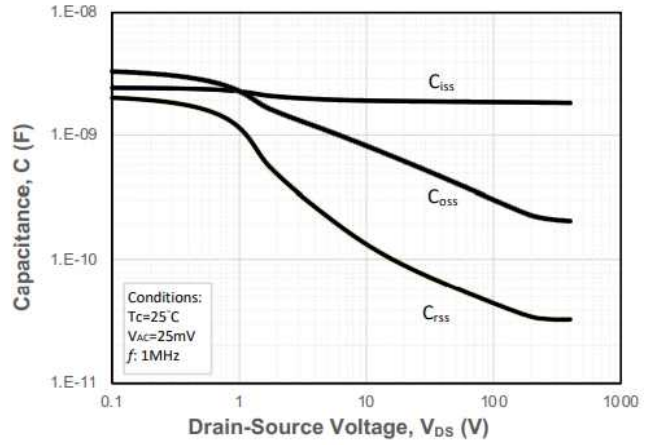


Typical electrical characteristics curves ($T_C = 25^\circ\text{C}$)

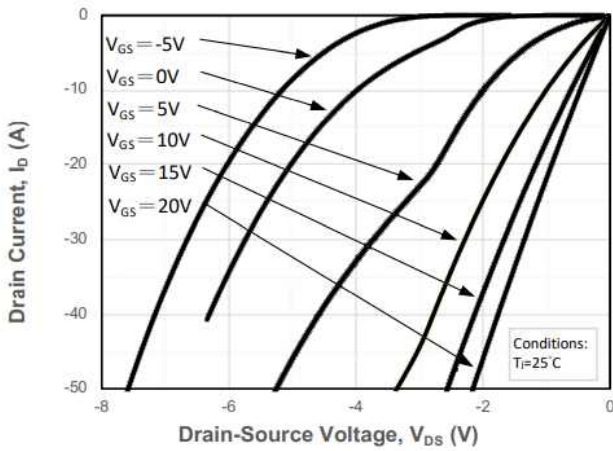
$T_j - R_{DS(on)}$ Characteristics



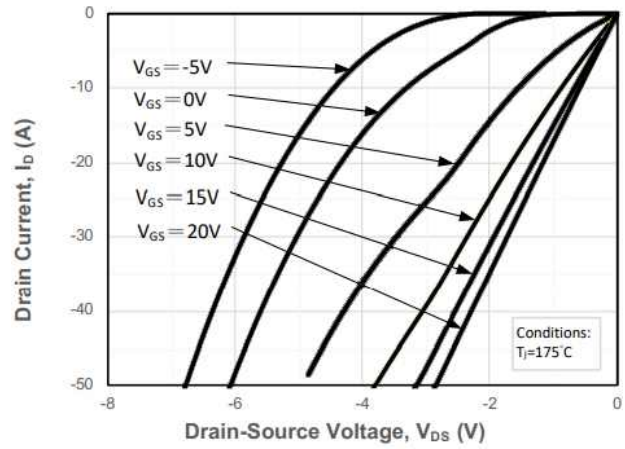
$V_{DS} - C$ Characteristics



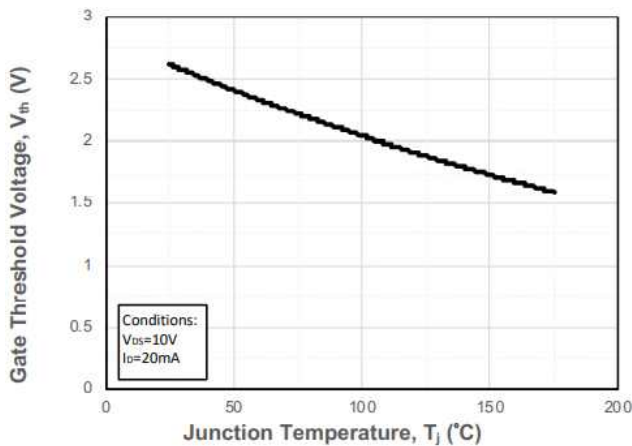
$V_{DS} - I_D$ Characteristics, $T_j=25^\circ\text{C}$



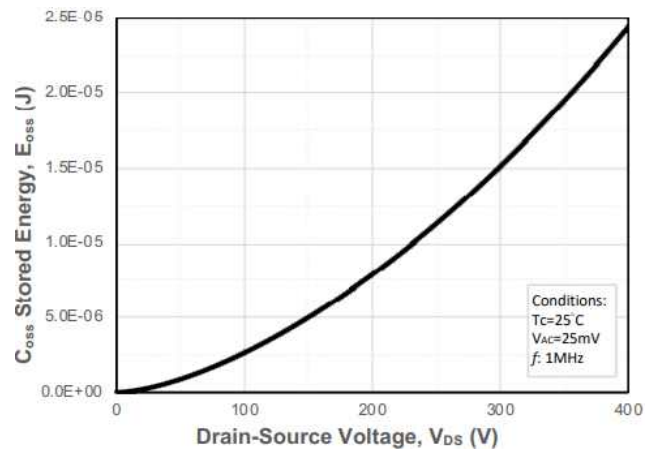
$V_{DS} - I_D$ Characteristics, $T_j=175^\circ\text{C}$



$T_j - V_{th}$ Characteristics

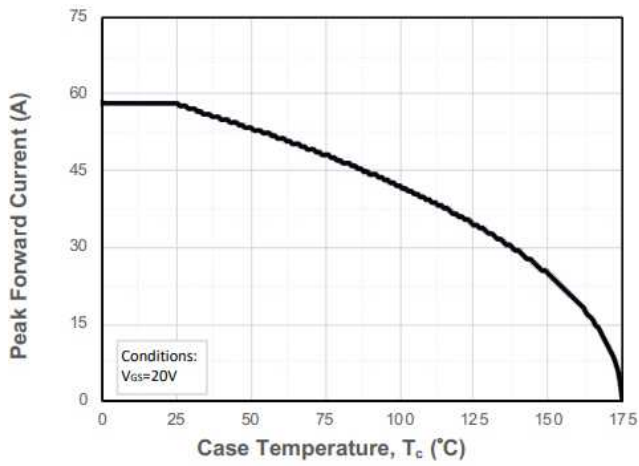


$V_{DS} - E_{oss}$ Characteristics

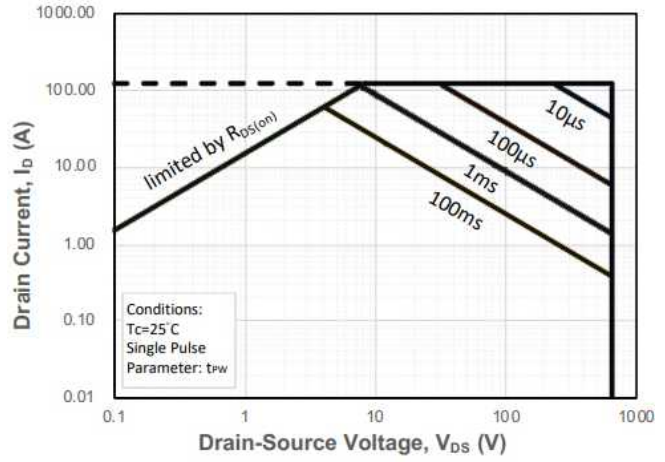


Typical electrical characteristics curves (T_C = 25°C)

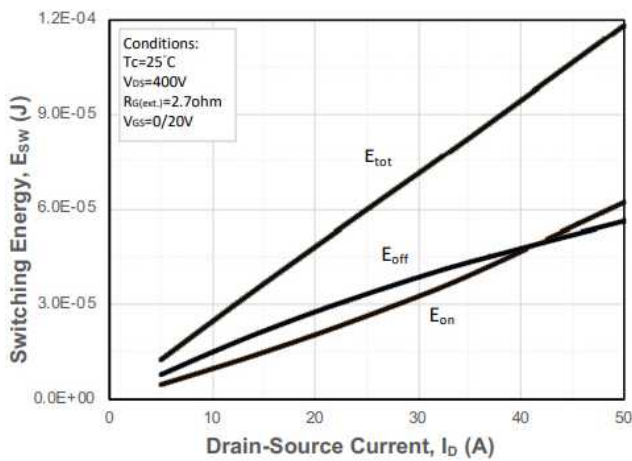
T_C – I_S Characteristics



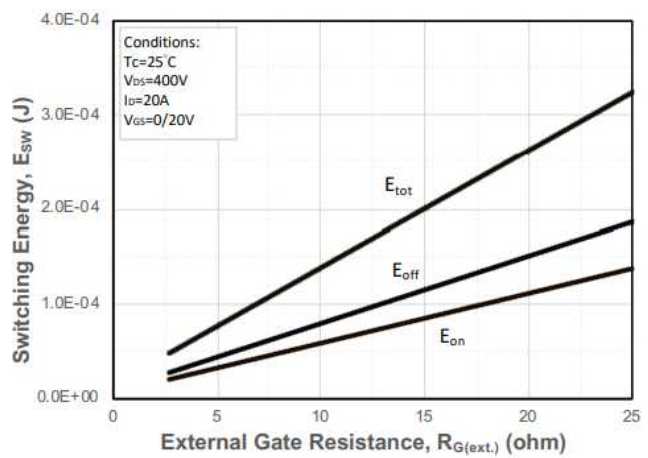
Safe Operating Area (SOA)



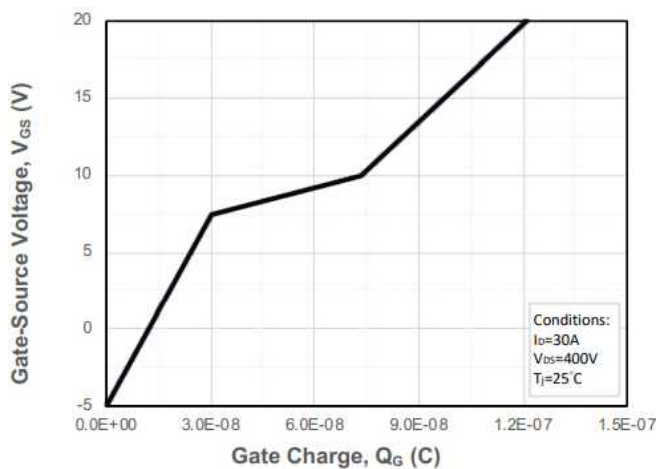
I_D – E_{SW} Characteristics



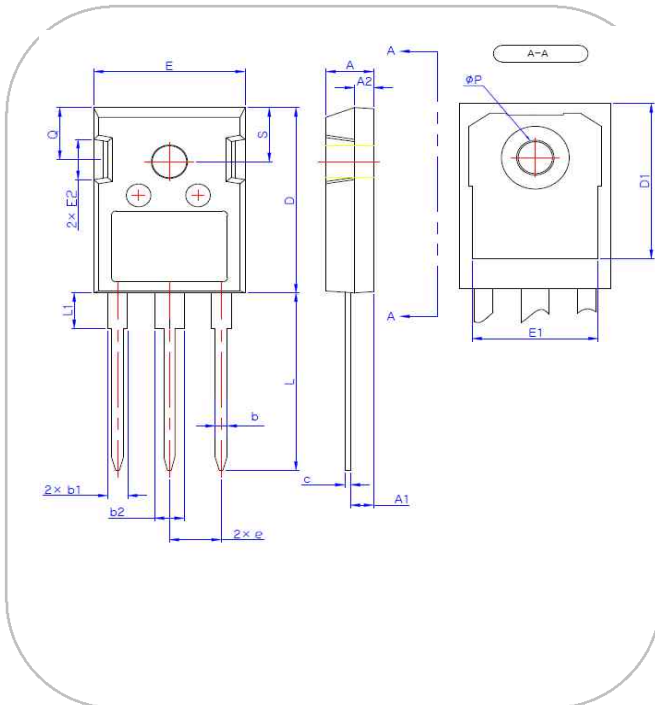
R_{G(ext)} – E_{SW} Characteristics



Q_G – V_{GS} Characteristics

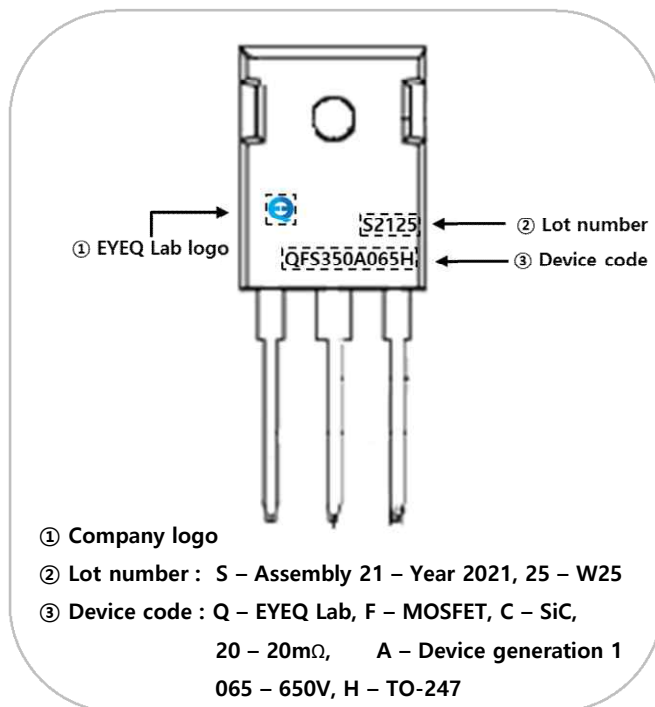


Package dimensions (TO-247)



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

