QS7R07A6U:

650V 75A

IGBT

www.questsemi.com

Features

- 650V trench gate/field termination process
- Low switching losses
- Vce(sat) has a positive temperature coefficient

Key Values

TYPE	VALUE	UNIT
$Type$	QS7R07A6U	
V_{CE}	650	V
I_C	75	A
$V_{CE(sat)}, T_{vj} = 25°C$	1.56	V
T_{vjmax}	175	°C
$Package$	T0-247	

Part Number

QS7R07A6U

Package

TO247

Marking

Q

Applications

IGBTs are essential in power electronics for their high voltage and current handling capabilities. They are ideal for:

Electric Vehicles: Improving power management.

Wind Turbines: Enabling efficient energy conversion.

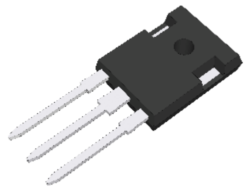
High-Speed Trains: Powering robust traction systems.

Industrial Automation: Enhancing motor control.

Power Grids: Stabilizing energy transmission.

Medical Equipment: Providing reliability in healthcare devices.

Package



Ver 1.0

QS7R07A6U:

650V 75A

IGBT

www.questsemi.com

IGBT

Absolute maximum ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	$T_{vj} = 25°C$	V_{CES}	650	V
Continuous DC collector current	$T_C = 100°C$ $T_{vj(\max)} = 175°C$	$I_{C(nom)}$	75	A
Repetitve peak collector current	$t_p = 1ms$	I_{CRM}	300	A
Gate Emitter voltage	$t_p \leq 10\mu s$ $D < 0.010$	V_{GE}	± 20 ± 30	V
Power Dissipation	$T_C = 25°C$ $T_C = 100°C$	P_{tot}	520 260	W
Temperature under switching conditions		$T_{vj\,op}$	$-40\ to\ 175$	°C
Storage temperature		T_{stg}	$-40\ to\ 150$	°C
Soldering Temperature			260	°C
Mounting Torque		M	0.6	Nm

Thermal Characteristics

Parameter	Conditions	Symbol	Value	Unit
IGBT thermal resistance, junction - case		$R_{th(j-C)}$	0.29	K/W
Diode thermal resistance, junction - case		$R_{th(j-C)}$	0.35	K/W

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min	Typ.	Max.	
Collector-Emitter Saturation voltage	$V_{GE} = 15V, I_C = 75A$ $T_{vj} = 25°C$ $V_{GE} = 15V, I_C = 75A$ $T_{vj} = 150°C$ $V_{GE} = 15V, I_C = 75A$ $T_{vj} = 175°C$	$V_{CE(sat)}$		1.56 1.86 1.90	2.00	V
Gate-Emitter threshold voltage	$V_{GE} = V_{CE}, I_C = 75A$ $T_{vj} = 25°C$	$V_{GE(TH)}$	3.8	4.4	5.0	V
Transconductance	$V_{CE} = 20V, I_C = 75A$	G_{fs}		58		S
Input capacitance	$V_{GE} = 0V, V_{CE} = 25V, f = 100kHz, T_{vj} = 25°C$	C_{ies}		4472		pF
Output capacitance		C_{oes}		171		pF
Reverse transfer capacitance		C_{res}		20		pF
Gate charge	$V_{GE} = 15V, V_{CE} = 520V, I_C = 75A, T_{vj} = 25°C$	Q_G		273		nC
Collector-emitter cut-off current	$V_{GE} = 0V, V_{CE} = 650V$ $T_{vj} = 25°C$	I_{CES}			1.0	mA
Gate-emitter leakage current	$V_{GE} = 20V, V_{CE} = 0V$ $T_{vj} = 25°C$	I_{GES}			200	nA
Turn-on delay time	$V_{CE} = 300V, I_C = 75A$ $T_{vj} = 25°C$ $V_{GE} = \pm 15V, R_G = 8\Omega$ $T_{vj} = 175°C$	t_{don}		25 27		ns
Rise time	$V_{CE} = 300V, I_C = 75A$ $T_{vj} = 25°C$ $V_{GE} = \pm 15V, R_G = 8\Omega$ $T_{vj} = 175°C$	t_r		130 122		ns
Turn-off delay time	$V_{CE} = 300V, I_C = 75A$ $T_{vj} = 25°C$ $V_{GE} = \pm 15V, R_G = 8\Omega$ $T_{vj} = 175°C$	t_{doff}		82 112		ns
Fall time	$V_{CE} = 300V, I_C = 75A$ $T_{vj} = 25°C$ $V_{GE} = \pm 15V, R_G = 8\Omega$ $T_{vj} = 175°C$	t_f		57 87		ns
Turn-on energy loss per pulse	$V_{CE} = 300V, I_C = 75A$ $T_{vj} = 25°C$ $V_{GE} = \pm 15V, R_G = 8\Omega$ $T_{vj} = 175°C$ $\frac{di}{dt} = 500A/\mu s$	E_{on}		2.68 3.24		mJ
Turn-off energy loss per pulse	$V_{CE} = 300V, I_C = 75A$ $T_{vj} = 25°C$ $V_{GE} = \pm 15V, R_G = 8\Omega$ $T_{vj} = 175°C$ $\frac{di}{dv} = 7800V/\mu s$	E_{off}		1.03 1.51		mJ

QS7R07A6U:

650V 75A

IGBT

www.questsemi.com

IGBT

Absolute maximum ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	$T_{vj} = 25℃$	V_{RMM}	650	V
Continuous DC forward current	$T_c = 100℃$ $T_{vjmax} = 175℃$	I_F	75	A
Repetitive peak forward current	$t_p = 1ms$	I_{FRM}	300	A

Characteristic values

Parameter	Conditions		Symbol	Value Min.	Typ.	Max.	Unit
Forward voltage	$I_F = 75A, V_{GE} = 0V$ $I_F = 75A, V_{GE} = 0V$ $I_F = 75A, V_{GE} = 0V$	$T_{vj} = 25℃$ $T_{vj} = 150℃$ $T_{vj} = 175℃$	V_F		1.55 1.69 1.70	2.0	V
Peak reverse recovery current	$I_F = 75A$ $\frac{-di_F}{dt} = \frac{500A}{\mu s} (T_{vj} = 175℃)$ $V_R = 300V, V_{GE} = -15V$	$T_{vj} = 25℃$ $T_{vj} = 175℃$	I_{RM}		16 26		A
Reverse recovered charge	$I_F = 75A$ $\frac{-di_F}{dt} = \frac{500A}{\mu s} (T_{vj} = 175℃)$ $V_R = 300V, V_{GE} = -15V$	$T_{vj} = 25℃$ $T_{vj} = 175℃$	Q_{rr}		1.28 3.18		μC
Reverse Recovery Time	$I_F = 75A$ $\frac{-di_F}{dt} = \frac{500A}{\mu s} (T_{vj} = 175℃)$ $V_R = 300V, V_{GE} = -15V$	$T_{vj} = 25℃$ $T_{vj} = 175℃$	t_{rr}		156 226		ns
Reverse recovered energy	$I_F = 75A$ $\frac{-di_F}{dt} = \frac{500A}{\mu s} (T_{vj} = 175℃)$ $V_R = 300V, V_{GE} = -15V$	$T_{vj} = 25℃$ $T_{vj} = 175℃$	E_{rec}		0.19 0.54		mJ

QS7R07A6U:

650V 75A

IGBT

www.questsemi.com

Figure 1: Typical output characteristics V_{GE} =15V

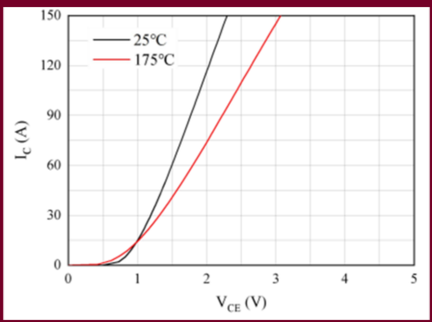


Figure 1: Typical output characteristics T_{vj}=175°C

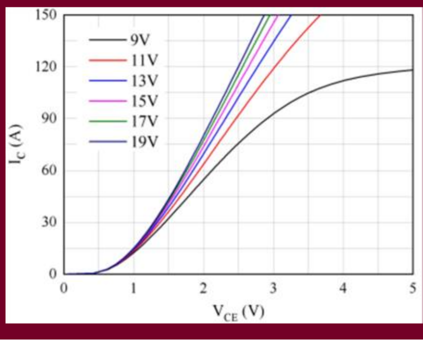


Figure 4: Transient thermal impedance IGBT Z_{thJC}=f(t)

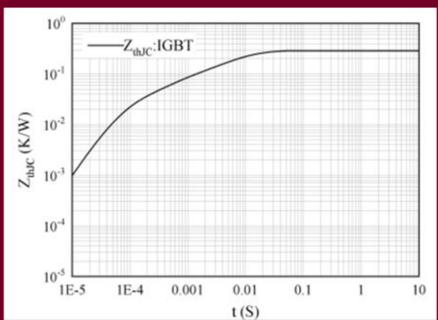


Figure 4: Transient thermal impedance FRD Z_{thJC}=f(t)

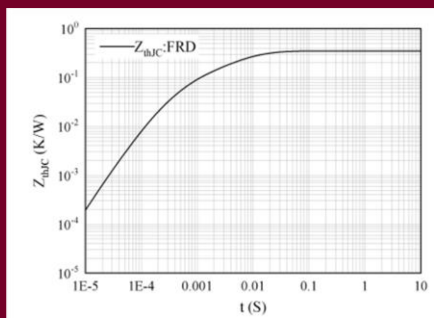


Figure 5: Typical transfer characteristic V_{CE}=20V

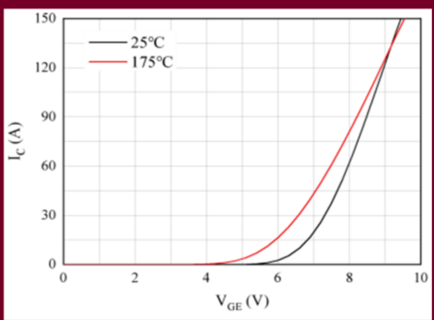


Figure 6: Forward characteristic of diode

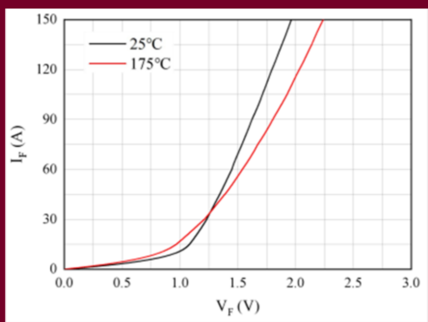


Figure 7: Switching losses of IGBT

$V_{GE} = \pm 15V, R_{g(on)} = 8\Omega, R_{g(off)} = 8\Omega, V_{CE} = 300V$

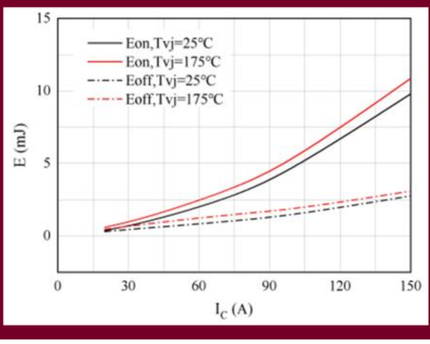


Figure 8: Switching losses of IGBT

$V_{GE} = \pm 15V, I_C = 75A, V_{CE} = 300V$

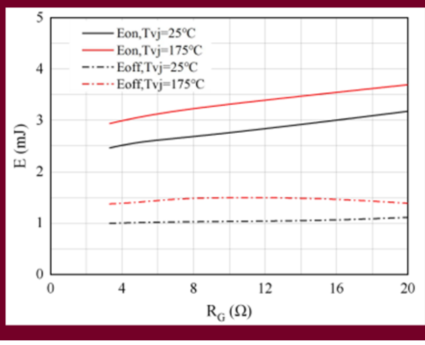


Figure 9: Switching losses of Diode

$R_{g(on)} = 8\Omega, V_{CE} = 300V$

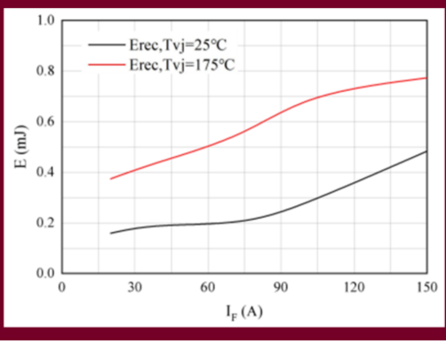


Figure 10: Switching losses of Diode

$I_F = 75A, V_{CE} = 300V$

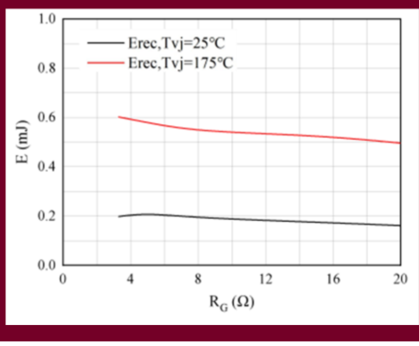
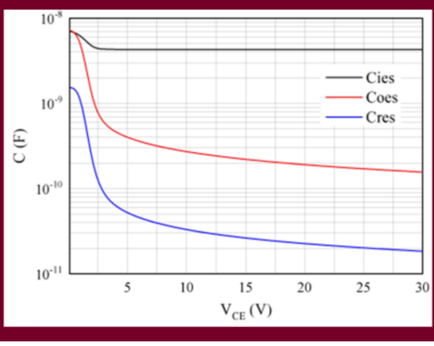
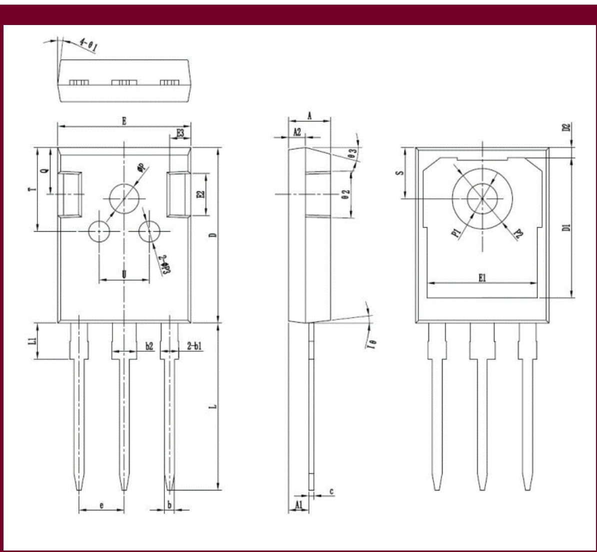


Figure 11: Capacitance characteristic





DIM	MIN	MAX
*A	4.9	5.1
*A1	2.31	2.51
A2	1.90	2.10
*b	1.15	1.25
*b1	1.95	2.25
*b2	2.95	3.25
*c	0.55	0.65
*D	20.90	21.10
D1	16.35	16.65
D2	1.05	1.35
*E	15.70	15.90
E1	13.10	13.40
E2	4.90	5.10
E3	2.40	2.60
*e	5.40	5.48
*L	19.80	20.10
*L1	–	4.30
*ϕP	3.70	3.90
*ϕP1	3.50	3.70
ϕP2	7.00	7.40
ϕP3	2.40	2.60
Q	5.60	6.00
*S	6.05	6.25
T	9.80	10.20
U	6.00	6.40
Θ1	5°	9°
Θ2	1°	5°
Θ3	13°	17°

Disclaimer:

The products described in this datasheet are intended for general-purpose applications, and their specifications and performance characteristics have been established under standard operating conditions. They are not specifically designed or authorized for use in life-critical or life-support systems. Life-critical systems are those in which the failure of a semiconductor device could lead to loss of life, severe injury, or severe damage to property.

It is essential to note that the use of our products in life-critical systems is strictly prohibited without prior written consent and agreement with Quest Semi. Any such usage is at the sole risk of the customer, and Quest Semi disclaims any liability, damages, or loss arising from the use of our products in such applications.

If you are considering the use of our products in life-critical systems, please contact our sales and technical support teams to discuss the necessary measures, risk assessment, and product customization that may be required to ensure compliance with the stringent safety and reliability standards associated with these applications. Customers are strongly advised to conduct their own analysis and testing to confirm the suitability and reliability of our products for their intended application, especially in life-critical systems.

Quest Semi reserves the right to make changes to product specifications and discontinue products without notice. It is the responsibility of the customer to ensure that the latest versions of datasheets are consulted before finalizing system designs or orders.