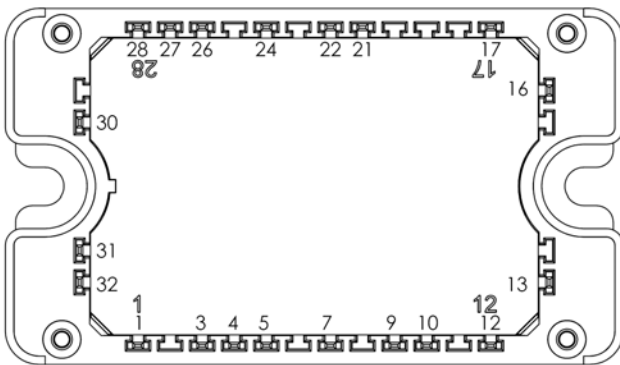
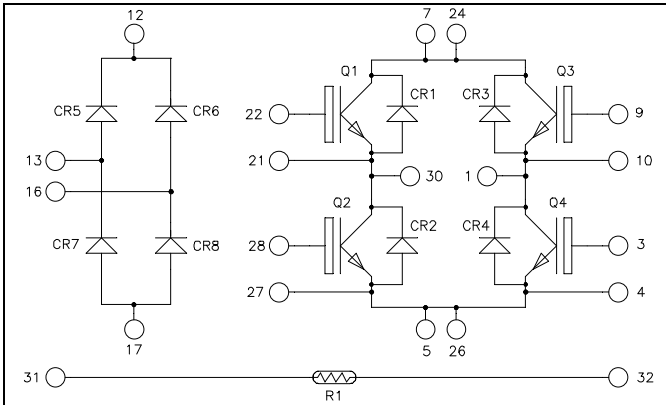


**Full bridge + rectifier bridge  
Trench + Field Stop IGBT3  
Power Module**

**$V_{CES} = 600V$   
 $I_C = 50A @ T_c = 80^\circ C$**



All multiple inputs and outputs must be shorted together  
7/24 ; 5/26

**Application**

- Solar converter

**Features**

- Trench + Field Stop IGBT3 Technology
  - Low voltage drop
  - Low tail current
  - Switching frequency up to 20 kHz
  - Soft recovery parallel diodes
  - Low diode VF
  - Low leakage current
  - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
- High level of integration
- Internal thermistor for temperature monitoring

**Benefits**

- Stable temperature behavior
- Very rugged
- Solderable terminals both for power and signal for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of  $V_{CES}$
- Low profile
- RoHS Compliant

**All ratings @  $T_j = 25^\circ C$  unless otherwise specified**

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on [www.microsemi.com](http://www.microsemi.com)

**1. Full bridge**
**Absolute maximum ratings** (per IGBT)

Symbol	Parameter	Max ratings	Unit
$V_{CES}$	Collector - Emitter Breakdown Voltage	600	V
$I_C$	Continuous Collector Current	$T_C = 25^\circ\text{C}$	80
		$T_C = 80^\circ\text{C}$	50
$I_{CM}$	Pulsed Collector Current	$T_C = 25^\circ\text{C}$	100
$V_{GE}$	Gate - Emitter Voltage	$\pm 20$	V
$P_D$	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	176
RBSOA	Reverse Bias Safe Operating Area	$T_J = 150^\circ\text{C}$	100A @ 550V

**Electrical Characteristics** (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$I_{CES}$	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}, V_{CE} = 600\text{V}$			250	$\mu\text{A}$
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15\text{V}$		1.5	1.9	V
		$I_C = 50\text{A}$	$T_J = 25^\circ\text{C}$			
				1.7		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 600\mu\text{A}$	5.0	5.8	6.5	V
$I_{GES}$	Gate - Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$			600	nA

**Dynamic Characteristics** (per IGBT)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{ies}$	Input Capacitance	$V_{GE} = 0\text{V}$ $V_{CE} = 25\text{V}$ $f = 1\text{MHz}$		3150		pF
$C_{oes}$	Output Capacitance			200		
$C_{res}$	Reverse Transfer Capacitance			95		
$Q_G$	Gate charge	$V_{GE} = \pm 15\text{V}, I_C = 50\text{A}$ $V_{CE} = 300\text{V}$		0.5		$\mu\text{C}$
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $25^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 50\text{A}$ $R_G = 8.2\Omega$		110		ns
$T_r$	Rise Time			45		
$T_{d(off)}$	Turn-off Delay Time			200		
$T_f$	Fall Time			40		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ( $150^\circ\text{C}$ ) $V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 50\text{A}$ $R_G = 8.2\Omega$		120		ns
$T_r$	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			250		
$T_f$	Fall Time			60		
$E_{on}$	Turn-on Switching Energy	$V_{GE} = \pm 15\text{V}$ $V_{Bus} = 300\text{V}$ $I_C = 50\text{A}$ $R_G = 8.2\Omega$	$T_J = 25^\circ\text{C}$	0.3		mJ
			$T_J = 150^\circ\text{C}$	0.43		
$E_{off}$	Turn-off Switching Energy	$I_C = 50\text{A}$ $R_G = 8.2\Omega$	$T_J = 25^\circ\text{C}$	1.35		mJ
			$T_J = 150^\circ\text{C}$	1.75		
$I_{sc}$	Short Circuit data	$V_{GE} \leq 15\text{V}; V_{Bus} = 360\text{V}$ $t_p \leq 6\mu\text{s}; T_J = 150^\circ\text{C}$		250		A
$R_{thJC}$	Junction to Case Thermal Resistance				0.85	$^\circ\text{C/W}$

**Reverse diode ratings and characteristics** (per diode)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage			600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R=600V$	$T_j = 25^\circ C$			250	$\mu A$
			$T_j = 150^\circ C$			500	
$I_F$	DC Forward Current	$T_c = 80^\circ C$			50		A
$V_F$	Diode Forward Voltage	$I_F = 50A$ $V_{GE} = 0V$	$T_j = 25^\circ C$		1.6	2	V
			$T_j = 150^\circ C$		1.5		
$t_{rr}$	Reverse Recovery Time		$T_j = 25^\circ C$		100		ns
			$T_j = 150^\circ C$		150		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 50A$ $V_R = 300V$ $di/dt = 1800A/\mu s$	$T_j = 25^\circ C$		2.6		$\mu C$
			$T_j = 150^\circ C$		5.4		
$E_{rr}$	Reverse Recovery Energy		$T_j = 25^\circ C$		0.6		mJ
			$T_j = 150^\circ C$		1.2		
$R_{thJC}$	Junction to Case Thermal Resistance					1.42	$^\circ C/W$

**2. Rectifier bridge**
**Absolute maximum ratings** (per diode)

<i>Symbol</i>	<i>Parameter</i>			<i>Max ratings</i>	<i>Unit</i>
$V_R$	Maximum DC reverse Voltage			600	V
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage				
$I_{F(AV)}$	Maximum Average Forward Current	Duty cycle = 50%	$T_C = 80^\circ C$	40	A
$I_{FSM}$	Non-Repetitive Forward Surge Current	8.3ms	$T_j = 45^\circ C$		

**Electrical Characteristics** (per diode)

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
$V_F$	Diode Forward Voltage	$I_F = 30A$			1.8	2.2	V
		$I_F = 60A$			2.2		
		$I_F = 30A$	$T_j = 125^\circ C$		1.5		
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 600V$	$T_j = 25^\circ C$			250	$\mu A$
			$T_j = 125^\circ C$			500	

### Dynamic Characteristics (per diode)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
$t_{rr}$	Reverse Recovery Time	$I_F=1A, V_R=30V$ $di/dt = 100A/\mu s$	$T_j = 25^\circ C$		22		ns
$t_{rr}$	Reverse Recovery Time	$I_F = 30A$ $V_R = 400V$ $di/dt = 200A/\mu s$	$T_j = 25^\circ C$		25		ns
			$T_j = 125^\circ C$		160		
$Q_{rr}$	Reverse Recovery Charge		$T_j = 25^\circ C$		35		nC
			$T_j = 125^\circ C$		480		
$I_{RRM}$	Reverse Recovery Current		$T_j = 25^\circ C$		3		A
		$T_j = 125^\circ C$		6			
$t_{rr}$	Reverse Recovery Time	$I_F = 30A$ $V_R = 400V$ $di/dt = 1000A/\mu s$	$T_j = 125^\circ C$		85		ns
$Q_{rr}$	Reverse Recovery Charge				920		$\mu C$
$I_{RRM}$	Reverse Recovery Current				20		A
$R_{thJC}$	Junction to Case Thermal Resistance					1.2	$^\circ C/W$

### 3. Thermal and package characteristics

**Temperature sensor NTC** (see application note APT0406 on [www.microsemi.com](http://www.microsemi.com) for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{25}$	Resistance @ 25°C		50		k $\Omega$
$\Delta R_{25}/R_{25}$			5		%
$B_{25/85}$	$T_{25} = 298.15 K$		3952		K
$\Delta B/B$	$T_C = 100^\circ C$		4		%

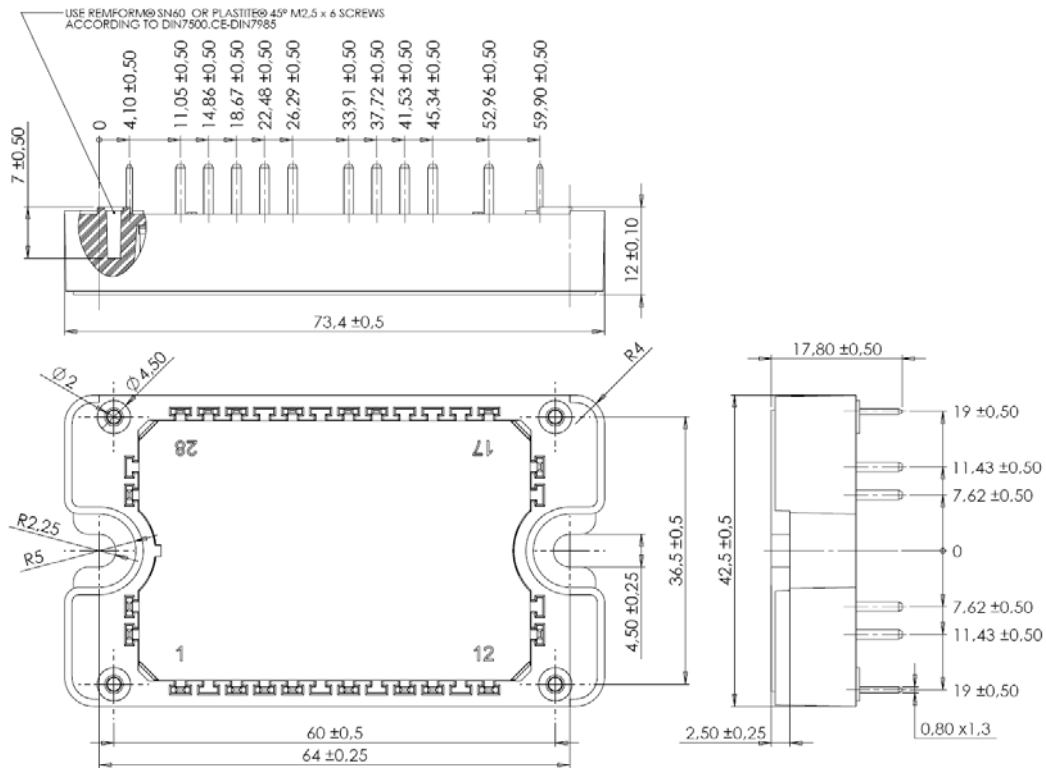
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature  
 $R_T$ : Thermistor value at T

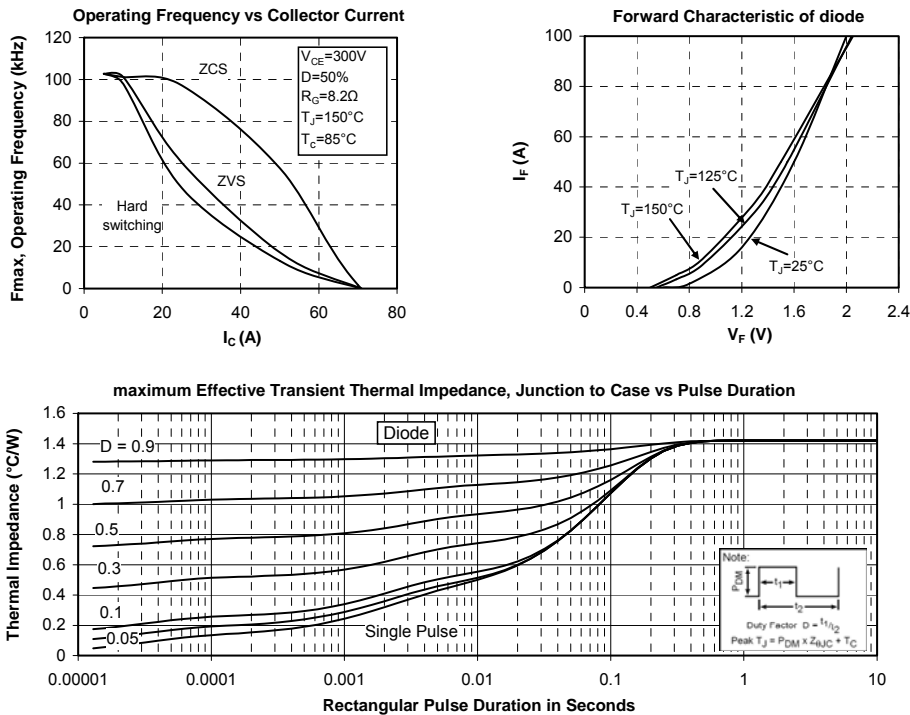
### Package characteristics

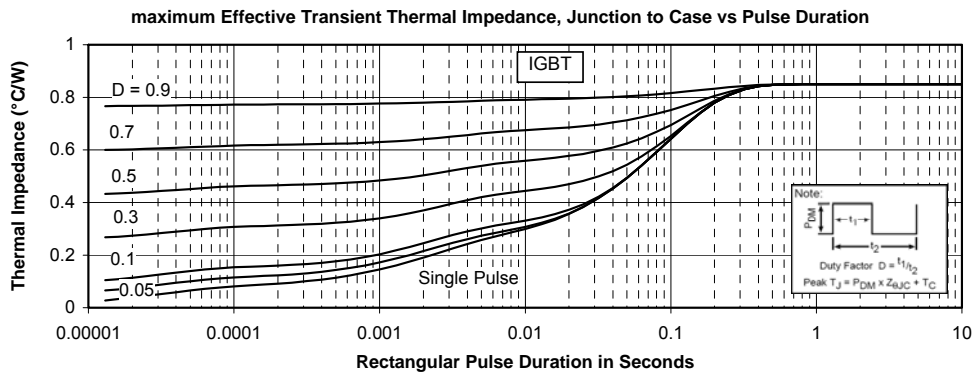
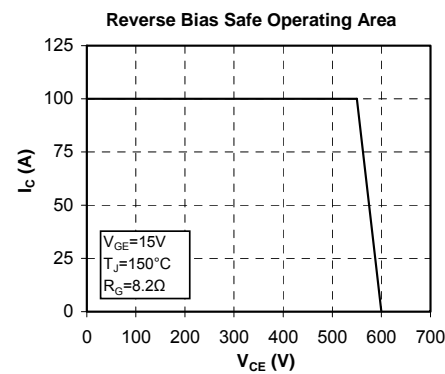
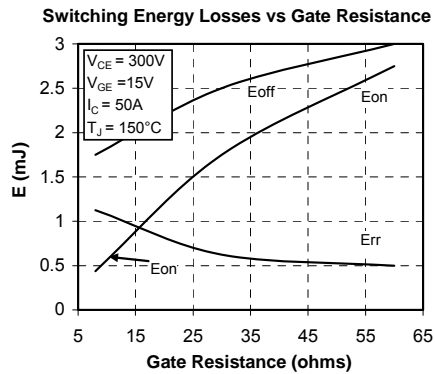
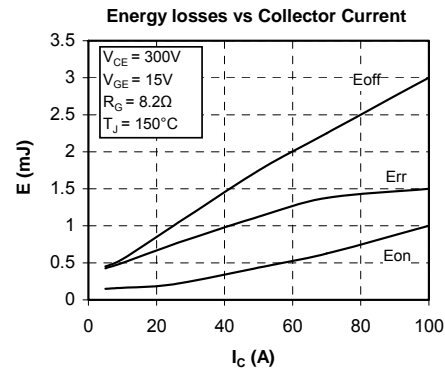
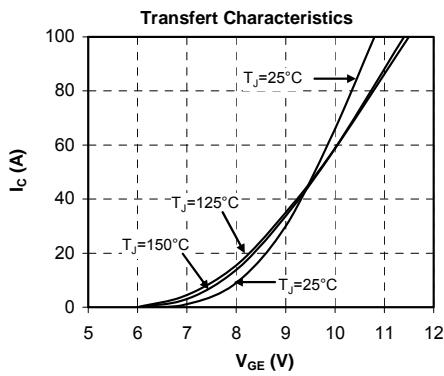
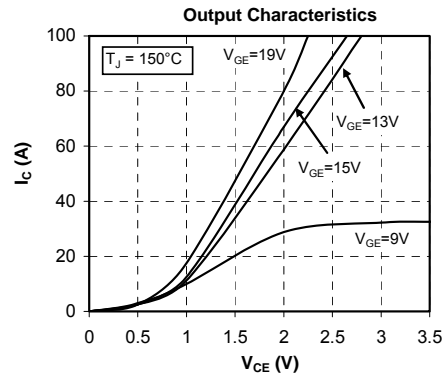
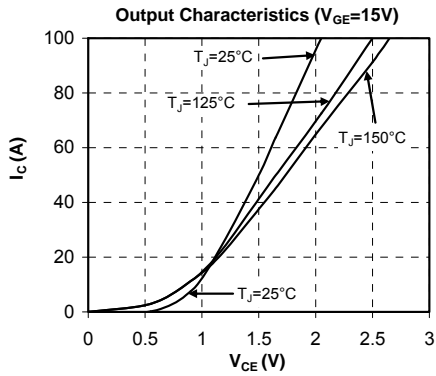
Symbol	Characteristic	Min	Typ	Max	Unit	
$V_{ISOL}$	RMS Isolation Voltage, any terminal to case t=1 min, I isol<1mA, 50/60Hz	4000			V	
$T_J$	Operating junction temperature range	-40		175	$^\circ C$	
$T_{STG}$	Storage Temperature Range	-40		125		
$T_C$	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M4	2.5	4.7	N.m
Wt	Package Weight				110	g

## SP3 Package outline (dimensions in mm)

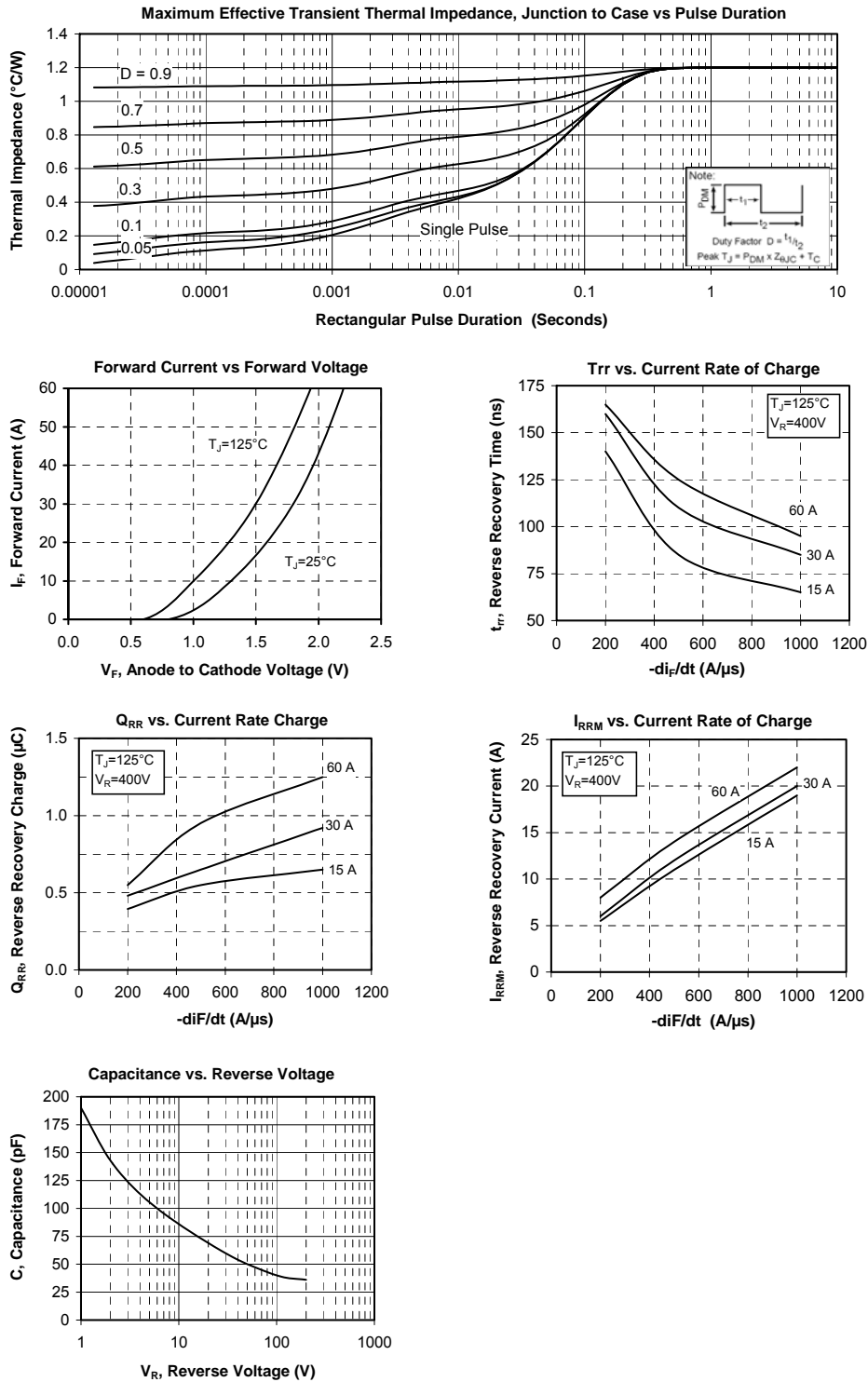


## 4. Typical full bridge Performance Curve (per IGBT and parallel diode)





## 5. Typical rectifier bridge Performance Curve (per diode)



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