

COMPOSITE MODULES INCORPORATED

Absolute Maximum Ratings

Collector to Emitter Voltage, V_{CE}	1200
Gate to Emitter Voltage, V_{GE}	$\pm 20V$
Continuous Collector Current, I_C , 90°C (Case)	24A
Pulsed Collector Current, I_{CM}	90A
Power Dissipation, P_D , 25°C (Case)	20W
Operating Temperature Range, T_J (Junction)	-55°C to +150°C
Thermal Resistance Junction to Case, θ_{JC}	1.70°C/W
Thermal Resistance Junction to Ambient, θ_{JA}	62°C/W
Storage Temperature Range, T_{SIG}	-55°C to +175°C
Soldering Temperature ($\leq 10S$)	300°C

ELECTRICAL SPECIFICATIONS: (T=25°C unless otherwise noted)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)CES}$	Collector-to Emitter Breakdown Voltage	1200			V	$V_{GE}=0V, I_C=250\mu A$
$V_{(BR)ECS}$	Emitter-to Collector Breakdown Voltage	18			V	$V_{GE}=0V, I_C=1.0A$
$V_{(BR)CES}/\Delta T_J$	Temperature Coeff. Of Breakdown Voltage		0.91		V/°C	$V_{GE}=0V, I_C=2.0mA$
$V_{CE(ON)}$	Collector-to Emitter Saturation Voltage		2.77	3.5	V	$I_C=24A, V_{GE}=15V$
			3.28			$I_C=45A, V_{GE}=15V$
			2.54			$I_C=25A, T_J=150^\circ C, V_{GE}=15V$
$V_{GE(TH)}$	Gate Threshold Voltage	3		6		$V_{CE}=V_{GE}, I_C=250\mu A$
$\Delta V_{GE(TH)}/\Delta T_J$	Temperature Coeff.of Threshold Voltage		-10		mV/°C	$V_{CE}=V_{GE}, I_C=2.0mA$
g_{fe}	Forward Transconductance	13	19		S	$V_{CE}=100V, I_C=24A$
I_{CES}	Zero Gate Voltage Collector Current			250	μA	$V_{GE}=0V, V_{CE}=1200V$
				2		$V_{GE}=0V, V_{CE}=10V, T_J=25^\circ C$
				5000		$V_{GE}=0V, V_{CE}=10V, T_J=150^\circ C$
I_{GES}	Gate-to-Emitter Leakage Current			± 100	nA	$V_{GE}=\pm 20V$
Switching Characteristics						
Q_g	Total Gate Charge (turn on)	-	180		nC	$I_C=24$
Q_{ge}	Gate-Emitter Charge (turn-on)	-	25			$C=400V$
Q_{gc}	Gate-Collector Charge (turn on)	-	70			$V_{GE}=15$
$T_d(on)$	Turn-On Delay Time	-	36		ns	
t_r	Rise Time	-	27			$T_J=25^\circ C$
$t_d(off)$	Turn-Off-Delay	-	200			$I_C=24A, V_{CC}=960V$
t_f	Fall Time	-	130			$V_{GE}=15V, R_G=5.0\text{ Ohms}$
E_{on}	Turn-on Switching Loss	-	1.21			Energy Losses Include "Tail"
E_{off}	Turn-Off-Switching Loss	-	2.25		mJ	
E_{ts}	Total Switching Loss	-	3.46			
T_{sc}	Short Circuit Withstand Time	10	-		μs	$V_{CC}=720, T_J=125^\circ C$ $V_{GE}=15V, R_G=5.0\text{ Ohms}$
$T_d(on)$	Turn-on Delay Time	-	35		ns	$T_J=150^\circ C$
t_r	Rise Time	-	29			$I_C=24A, V_{CC}=960V$
$t_d(off)$	Turn-Off Delay Time	-	380			$V_{GE}=15V, R_G=5.0\text{ Ohms}$
t_f	Fall Time	-	280			Energy losses include tail
E_{ts}	Total Switching Loss	-	7.8			mJ
L_E	Internal Emitter Inductance	-	13		nH	Measured 5 mm from package
C_{ies}	Input Capacitance	-	2800		pF	$V_{GE}=0V$
C_{oes}	Output Capacitance	-	140			$V_{CC}=30V$
C_{res}	Reverse Transfer Capacitance	-	53			$f=1MHz$

CMI has made every effort to insure the accuracy of this specification. However, no responsibility is assumed for possible omissions and /or inaccuracies. CMI reserves the right to make changes to this specification without further notice to improve reliability, function, or design. Changes and additions made after the publication of this data sheet will be reflected in updated sheets. CMI does not assume any liability arising out of the application or use of circuit described herein; nei-

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SWITCHING CHARACTERISTICS: (T=25°C unless otherwise noted)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)CES}$	Collector-to Emitter Breakdown Voltage	1200			V	$V_{GE}=0V, I_C=250\mu A$
$V_{(BR)ECS}$	Emitter-to Collector Breakdown Voltage	18			V	$V_{GE}=0V, I_C=1.0A$
$V_{(BR)CES/\Delta T_J}$	Temperature Coeff. Of Breakdown Voltage		0.91		V/°C	$V_{GE}=0V, I_C=2.0mA$
$V_{CE(ON)}$	Collector-to Emitter Saturation Voltage		2.77	3.5	V	$I_C=24A, V_{GE}=15V$
			3.28			$I_C=45A, V_{GE}=15V$
			2.54			$I_C=25A, T_J=150^\circ C, V_{GE}=15V$
$V_{GE(TH)}$	Gate Threshold Voltage	3		6		$V_{CE}=V_{GE}, I_C=250\mu A$
Delta $V_{GE(TH)}/\Delta T_J$	Temperature Coeff.of Threshold Voltage		-10		mV/°C	$V_{CE}=V_{GE}, I_C=2.0mA$
g_{fe}	Forward Transconductance	13	19		S	$V_{CE}=100V, I_C=24A$
I_{CES}	Zero Gate Voltage Collector Current			250	μA	$V_{GE}=0V, V_{CE}=1200V$
				2		$V_{GE}=0V, V_{CE}=10V, T_J=25^\circ C$
				5000		$V_{GE}=0V, V_{CE}=10V, T_J=150^\circ C$
I_{GES}	Gate-to-Emitter Leakage Current			± 100	nA	$V_{GE}=\pm 20V$
Switching Characteristics						
Q_g	Total Gate Charge (turn on)	-	180		nC	IC = 24 C = 400V VGE = 15
Q_{ge}	Gate-Emitter Charge (turn-on)	-	25			
Q_{gc}	Gate-Collector Charge (turn on)	-	70			
$T_d(on)$	Turn-On Delay Time	-	36		ns	TJ = 25°C IC = 24A, VCC = 960V VGE = 15V, RG = 5.0 Ohms
t_r	Rise Time	-	27			
$t_d(off)$	Turn-Off-Delay	-	200			
t_f	Fall Time	-	130			
E_{on}	Turn-on Switching Loss	-	1.21		mJ	Energy Losses Include "Tail"
E_{off}	Turn-Off-Switching Loss	-	2.25			
E_{ts}	Total Switching Loss	-	3.46			
T_{sc}	Short Circuit Withstand Time	10	-		μs	VCC = 720, TJ=125°C VGE = 15V, RG = 5.0 Ohms
$T_d(on)$	Turn-on Delay Time	-	35		ns	TJ = 150°C IC= 24A, Vcc = 960V VGE = 15V, RG = 5.0 Ohms Energy losses include tail
t_r	Rise Time	-	29			
$t_d(off)$	Turn-Off Delay Time	-	380			
t_f	Fall Time	-	280			
E_{ts}	Total Switching Loss	-	7.8			
LE	Internal Emitter Inductance	-	13		nH	Measured 5 mm from package
C_{ies}	Input Capacitance	-	2800		pF	VGE = 0V Vcc = 30V f=1MHz
C_{oes}	Output Capacitance	-	140			
C_{res}	Reverse Transfer Capacitance	-	53			