INTEGRAL REPRESENTATION OF $p$-CLASS GROUPS IN $\mathbb{Z}_p$-EXTENSIONS AND THE JACOBIAN VARIETY

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ABSTRACT. For an arbitrary finite Galois $p$-extension $L/K$ of $\mathbb{Z}_p$-cyclotomic number fields of CM-type with Galois group $G = \text{Gal}(L/K)$ such that the Iwasawa invariants $\mu_L, \lambda_L$ are zero, we obtain unconditionally and explicitly the Galois module structure of $\mathcal{C}_L(p)$, the minus part of the $p$-subgroup of the class group of $L$. For an arbitrary finite Galois $p$-extension $L/K$ of algebraic function fields of one variable over an algebraically closed field $k$ of characteristic $p$ as its exact field of constants with Galois group $G = \text{Gal}(L/K)$ we obtain unconditionally and explicitly the Galois module structure of the $p$-torsion part of the Jacobian variety $J_L(p)$ associated to $L/k$.